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ABSTRACT

Intended as a basis for continuing and expanding cooperative network activities, this publication presents five comprehensive reports developed in 1981/82 which assess the academic libraries of the 16 public and private postsecondary educational institutions in Alabama. The five reports cover collection development, staff adequacy, space requirements, statewide bibliographic and physical accessibility to academic library services, and computerization and library networking. Comparisons are made to commonly accepted standards and criteria, and comparative analyses are provided of Alabama's academic libraries against regional and national measures of excellence, and the national state-of-the-art in computers and automation. Each report presents conclusions and recommendations which are cumulated in the front of the publication. Also noted are the functions and activities of academic libraries, the need for a comprehensive plan for cooperative resource sharing among Alabama's academic libraries, and limitations on the scope and focus of study. A membership list of the Alabama Commission on Higher Education (ACHE) Council of Librarians, 8 tables, 21 appendices, and a 16-item bibliography are included. (Author/ESR)

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COOPERATIVE LIBRARY RESOURCE SHARING AMONG UNIVERSITIES SUPPORTING GRADUATE STUDY IN ALABAMA

REPORT NUMBER ONE: COLLECTION DEVELOPMENT
REPORT NUMBER TWO: STAFF ADEQUACY
REPORT NUMBER THREE: SPACE REQUIREMENTS
REPORT NUMBER FOUR: STATEWIDE BIBLIOGRAPHIC AND PHYSICAL ACCESSIBILITY
REPORT NUMBER FIVE: COMPUTERIZATION

Prepared By

ALABAMA COMMISSION ON HIGHER EDUCATION COUNCIL OF LIBRARIANS

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ABSTRACT

Cooperative Library Resource Sharing Among Universities Supporting Graduate Study in Alabama

A study of academic libraries in the State of Alabama by the Council of Librarians, an advisory Council to the Alabama Commission on Higher Education, was completed in April 1982. The impetus for the study came from the Council of Graduate Deans, also an advisory Council to the Alabama Commission on Higher Education, and was presented to that body at their Spring meeting, April 21 to 23, 1982.

Cooperative Library Resource Sharing Among Universities Supporting Graduate Study in Alabama is a qualitative statement about one component of our postsecondary institutional resources and is based on the assumption that academic libraries represent a valid barometer of institutional excellence in programmatic development and research.

This statewide study consists of five independent reports developed over a period of twelve months which collectively represent a comprehensive assessment of the academic libraries of sixteen postsecondary institutions, both public and private. In addition, the reports establish the foundation for continuing and expanding cooperative network activities. Included in the study are detailed analyses of collection development as well as staff and space adequacy according to commonly accepted standards and criteria; current status and trends in bibliographic and physical access; and a profile of Alabama's academic library computerization activities against the state-of-the-art in library computerization nationally. The reports also provide comparative analyses of the libraries against regional and national measures of excellence.

The recommendations which emerge from the study culminate in a systematic plan for cooperative resource sharing among academic libraries supporting graduate education, a plan which, if only partially implemented, would serve to enrich substantially not only the existing system but other statewide multi-type library networks as well. The completion of the study is testimony to the climate and level of cooperative activity which currently exists among the State's academic librarians and reinforces the status of the council of Librarians as a mechanism of proven capability for future efforts.

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PREFACE AND RECOMMENDATIONS

The findings and conclusions of the five reports contained in this study will not be too surprising to anyone with knowledge about the availability of state, federal, and private resources to fund properly the academic programs in the state of Alabama. However, the purpose of this study has been neither to profile the academic libraries supporting graduate education in the State as the most poorly supported component of the larger educational enterprise nor to attempt to gain attention by making invidious comparisons between allocations for libraries as opposed to laboratories, capital improvements and expansion, and development of other academic programs. Rather the intent is to assist the State and the individual institutions in becoming aware of the larger choices which must be made for effective planning in higher education in the State, planning which must include a meaningful approach to quality.

The central assumption of this study is that libraries are a significant barometer of the quality of graduate educational programs and research. Planning for quality education in the decade ahead must take into serious consideration the impact that the new federalism will have on support for libraries, the State funding priorities for education at all levels, and institutional programmatic development. It is foolish to believe that there will

be sufficient funding to erase immediately the current deficiencies of all libraries, even as it is equally absurd to believe that in light of the information explosion any library will be able to supply adequately all the resources needed for graduate education and research at the parent institution. It is imperative to point out that the citizens of the State, the students attending our institutions, and the administrators and faculties of the institutions who deliver graduate education can no longer be permitted the grand illusion of assuming that quality education can be offered within the walls of academe in Alabama with a paucity of supporting library resources.

Data and analyses within this study clearly indicate that the institutions have already over-extended themselves in relation to available library resources. While institutional collections may not be inadequate in an absolute sense because some subject components may satisfactorily support specific graduate programs, they are clearly inadequate in terms of the total graduate programs which they are attempting to support. In short, the conclusions of this study indicate a need for libraries to tailor their efforts by strengthening the weakest parts of their collections.

The study has attempted to develop recommendations for planning whereby the collective resources of the libraries may be utilized to enhance graduate education in the State.

Nonetheless, the Council of Librarians cannot in good conscience advocate a system of networking which would do little more than share bibliographic poverty.

At the very minimum, this study is a status report of current library adequacy and establishes the foundation for continued cooperative efforts. At the optimum, all recommendations contained herein would receive full funding, bringing the academic libraries to minimum levels of adequacy in areas discussed in this report. Alabama would become the first state to have an online union list of all academic library holdings readily accessible by terminal at each institution, and there would be an ongoing commitment by the State and the institutions to provide support for approved academic programs and research.

Reasonable, near-term expectations would include the establishment of a network of academic libraries in the State with the responsibility of developing a computerized network; the development of meaningful criteria for the assessment of libraries and their capabilities of supporting new and existing program reviews; the establishment of a union list of serials; the organization and establishment of guidelines for conversion of existing card catalogs to machine-readable forms; the active involvement of the Council of Librarians in the review or development of statewide library funding formulas; and, given the importance of computerization

in library functions, the involvement of librarians in the local planning and development of automated systems.

DIAGRAM OF STUDY EXPECTATIONS

Optimum Expectations

1. All recommendations fully funded - libraries would be brought to minimum levels of adequacy in all areas.
2. First state to have all holdings on data base.
3. Ongoing commitment by State and institutions to provide adequate resources to support programs and research.

Reasonable Expectations

1. Alabama academic library network established to share resources in the initial activities of library computerization.
2. Impact on program review/role and scope.
3. Union list of serials.
4. Card catalog/monograph conversion project.
5. Librarians involved in statewide formula development and institutional computerization.

Minimum Expectations

1. Study is merely a status report of current library adequacy.
2. Establish foundation for continued cooperative efforts.

RECOMMENDATIONS

The recommendations stated below and which appear in the reports to follow will require a response from a number of administrative components of higher education in the State. To implement even a portion of them will necessitate the active support and cooperation of the Alabama Commission on Higher Education (ACHE) and the Commission's Advisory Councils of Librarians, Graduate Deans, Chief Academic Officers, and Presidents. Moreover, this report can be successful only to the extent that the administrations of the individual institutions and ACHE work together to see that its provisions are clearly understood by the executive and legislative branches of state government.

A. ALABAMA ACADEMIC LIBRARIES NETWORK (AALN)

1. One of the primary concerns which motivated the initiation of this study by the ACHE Council of Librarians was the desire to identify fruitful ways in which the state's academic libraries might better cooperate and share their resources to the benefit of graduate education. The formation of library networks for sharing resources is now more than at any other time the principal means for fulfilling this need. Accordingly, the central recommendation of this report is that the state sanction the formation of an Alabama Academic Libraries Network charged with the initial goal of linking together Alabama's academic libraries via telecommunication with computer controlled message switching and data-base access.

2. While much of the work of the network can be undertaken with volunteer committees, the implementation of a variety of computer support activities and systems will be expedited through a network coordinator who will guide and facilitate planning and other activites.

Salary and other supporting funding will cost approximately $50,000 per year to be shared by all academic institutions. Funding, governance, and bylaws recommendations for the network will be developed by an organizing committee.

B. COLLECTION DEVELOPMENT

3. Provide for current rates of acquisitions capable of supplying the on-going need for new books and periodicals to support the curricular offerings and research programs of the parent institutions.

4. Sufficient permanent financial support should be provided for Auburn University to qualify for membership in the Association of Research Libraries, and both Auburn and the University of Alabama should be funded in a manner that would permit them to rank at the median level among ARL academic libraries. Such funding would ensure their maintaining membership in this organization permanently.

5. Those Alabama academic libraries supporting a wide range of instructional and research programs should have sufficient strength and financial support to enable them to become members of the Asscciation of Southeastern Research Libraries. The University of South Alabama, because of its graduate programs and library collections, is approaching eligibility for membership. Steps should be taken to facilitate that institution's admission into ASERL.

6. Assistance of a permanent nature should be provided to the three existing Alabama members of ASERL to improve their ranking among their peers within this regional organization. An immediate goal of achieving a median level in the major categories of library service, staff, and fiscal support is suggested for all three. The University of Alabama and Auburn University may wish to aspire to a third quartile ranking among their Southeastern colleagues.

7. Median level rankings in all areas of library support, when compared with regional peer groups, should be the immediate goal of

libraries supporting graduate programs. Using library HEGIS tapes and the computer analysis, establish peer group benchmarks for all other academic libraries in the State which are equivalent to the ASERL and ARL benchmarks used by AU, UA, UAB, and USA.

8. Initiate a statewide series of coordinated academic library collection analyses to identify the collection strengths and weaknesses of each academic library. The data gathered from these studies will then support the successful implementation of the following actions:

   a. Eliminate existing quantitative and qualitative collection deficiencies through a multi-year retrospective collection development program.

   b. Continue, and enhance, a selective retrospective conversion project so that awareness of particularly strong collections can be made available to all.

   c. Develop guidelines for a statewide academic library shared collection development policy and procedure.

9. The Alabama Commission on Higher Education in cooperation with the Alabama Academic Libraries Network should develop a reasonable mechanism for reviewing library collection adequacy as part of the process of review and approval of new academic programs. This mechanism will insure that collections adequate to support these programs are in place or will be funded within five years from initial program approval.

10. Provide for the installation of compatible security systems in the academic libraries of the State.

    a. Install new systems in the five libraries without security.

    b. Intall additional security equipment in the six libraries requesting improvement in current equipment configurations.

C. STAFFING

11. Begin working immediately to increase the number of staff to meet the level of adequacy suggested by nationally accepted guidelines.

12. As additions to library staff are made, the mix of librarians to support staff and student assistants should be changed to approximate a staffing pattern of one-fourth, librarians; one-half, support staff; and one-fourth, student assistants.

13. Personnel, in all categories, should have appropriate education, training, and experience including, when necessary, graduate or professional degrees in their areas of specialization.

D. SPACE

14. The space needs of academic libraries in Alabama should be remedied by a large infusion of capital funds.

15. At the state level, the need to house adequately the resources of Alabama's academic libraries should be carefully considered in the development of capital construction priorities.

16. ACHE's Council of Librarians should be encouraged to explore the possibilities of cooperative storage and other models which might serve to ameliorate the pressures on campus library facilities.

17. At the institutional level, it is important that library staff and institutional planners develop plans which would establish adequacy under the Bareither or ACRL standards as a matter of institutional priority. Planners should also address the consequences of accelerated acquisition rates upon library space. Universities with central research libraries and one or more branch libraries have library space needs which exceed those indicated by the standard formulas used in this report.

18. The Council of Librarians needs to undertake a statewide analysis of the appropriateness of the structural and mechanical design of older buildings not originally constructed to house library collections.

E. BIBLIOGRAPHIC AND PHYSICAL ACCESS

19. Establish a computer-based bibliographic record of the holdings of all Alabama academic libraries accessible at each college or university library through the following actions:

    a. Secure membership via SOLINET in the On-line Computer Library Center (OCLC) for all Alabama academic libraries which are not currently OCLC members.

    b. Enter bibliographic and location information for all new acquisitions into the OCLC bibliographic subsystem for each academic library.

    c. Enter bibliographic and location information into the OCLC union list of serials holdings subsystem for each academic library's complete serial holdings.

    d. Enter bibliographic and location information for selected older materials into the OCLC bibliographic subsystem (i.e., selective retrospective conversion) for each academic library.

20. Develop an interlibrary loan agreement and a delivery system, probably using United Parcel Service, to facilitate reasonably prompt physical access to Alabama academic library resources for all users of these libraries.

21. All academic libraries should join in the development of a state union list of serials and begin the creation of machine-readable records in OCLC's union list mode.

22. A graduate borrower's card program should be developed to facilitate the inter-institutional use of library resources by the faculty and graduate students involved in resident graduate programs.

F. COMPUTERIZATION AND NETWORKING

23. Continue in the commitment to membership in OCLC and SOLINET for all academic libraries in the State. In addition, as an interim measure, explore the possibilities of "clustering" libraries and/or "contracting for" the inputting of holdings information.

24. Continue in the commitment to OCLC retrospective conversion of major collection strengths to facilitate inter-library loan activities and collection development. In the interim, explore the alternatives of paying a vendor to create MARC machine-readable records and/or undertaking conversion by contracting with other libraries.

25. Make a commitment to providing access to information services (online database searching) for faculty, students, or other library users. Depending upon the databases searched and the amount of searching done, hourly prices can range from $15 to $300, though this may be charged to the library user either partially or totally. In addition, as an interim measure, explore possibilities of contracting with other libraries for the provision of this service.

26. Following a review and selection process, each university should install in each academic library a jointly agreed upon brand of micro-computer with necessary operating software. A basic system can be implemented for approximately $5,000. The network of academic libraries would select one library to serve as a clearinghouse for all purchased and developed software.

27. Based upon microcomputer technology and software develop an Alabama academic library electronic mail system. Software already exists to support this activity so that expense to the library beyond the microcomputer and the software package would be for long distance phone services (most of which can occur in the evening).

28. As a network or independent activity:

    a. Establish a committee to arrive at protocols and guidelines for the consistent recording on machine-readable records of bibliographic holdings information for both serials and monographs.

    b. Establish a committee charged with developing a series of computer education programs and seminars to be financed by participation fees. Depending upon level of activity, costs may approximate $100 per librarian per year.

    c. Establish a committee or committees charged with developing a program for each interested library to begin the necessary preparatory work leading up to system implementation.

    d. Establish a mechanism to review alternatives for system implementation, including, for example, clustered use of turnkey or locally developed systems.

    e. Establish a committee and hire a consultant to review the necessity for and manner of linking individual local library integrated systems as they come into existence. The consultant's report will become part of the computerization master plan and will cost approximately $2,000.

In concluding this preface and recommendations, it is worth noting the major effects of the failure to undertake the recommended actions. The most serious consequences will be that, without adequate funding, Alabama's libraries will remain understaffed, poorly housed, bibliographically inadequate, and isolated from the mainstream of academic library computerization. Without adequate funding for the purchase of current materials, the weaknesses of existing collections will be compounded.

DIAGRAM
THREE PHASE PLAN FOR
ACHE COUNCIL OF LIBRARIANS COOPERATIVE RESOURCE SHARING

PHASE	SPACE REQUIREMENTS	BIBLIOGRAPHIC ACCESS	PHYSICAL ACCESS	COMPUTERIZATION	COLLECTION DEVELOPMENT	REGIONAL COMPARISONS	STAFF ADEQUACY	INSTITUTIONAL PLANNING
I	Study involving special considerations: microforms, etc.; branch libraries, load-bearing floors Local planning for institutional priorities	Membership or holdings in OCLC for serials & monographs. ILL agreement & delivery system Borrowers card (Graduate Libraries)	Electronic Theft Detection Delivery systems	Data Base Searching Microcomputers Alabama Academic Library Network Guidelines for retrospective conversion on OCLC Implementation Mechanism Computer Education Committee Systems Analysis Committee	Funds for current acquisitions Integration of meaningful criteria in program review and recommendation Benchmark by analyzing HEGIS data	Build toward membership in ARL for Auburn Build toward raising UA in ARL standards Build toward USA in ASERL Build toward raising UAB to median level in ASERL	Add staff to each library (institution specific) Correct mix of professional/staff/student Statewide study of staffing patterns including e.g., development of model job descriptions and analysis and development of comparative salary-scales	Involvement in statewide formula funding review Involvement in institutional computerization planning and operations Criteria in program review and recommendations
II	Consideration of alternatives: compact shelving, regional storage, facilities, CRL membership, etc. Capital funds for building (from state)	Retrospective Conversion of monographs Statewide ILL based on OCLC or electronic bulletin boards		Alabama academic library electronic mail system Consultant to link systems	Collection analysis Retrospective Funds			
III					Shared Collection Development Guidelines	Auburn & UA rank at median quartile in ARL & 3rd quartile in ASERL		

INTRODUCTION

Strengthening the state's postsecondary education programs is essential to building the infrastructure necessary to attract business and industry. More importantly, without strong research institutions to provide substantial graduate curricula, Alabama cannot hope to garner its fair share of the economic growth occurring in the "Sun Belt." Lacking strong libraries, Alabama cannot have strong graduate education.

Collectively, the academic libraries of Alabama are a major education and cultural resource. Independently, each library is closely tied to the parent institution's mission and program; reflects the diversity of the education, research and public service goals of that institution; and determines the institution's ability to support these goals. In order to furnish the library services, materials, and facilities necessary to support the teaching, research, and service programs of the respective colleges and universities, the academic libraries must be provided adequate financial support to maintain continued rational collection development, adequate physical facilities, strong staffing and staff development, and effective organization and administration.

Progress in achieving these goals has been slow in the past. Events of the present have further reduced the abilities

of libraries to maintain current activities at an acceptable level and will make it virtually impossible to meet future demands on existing resources. In recent years library budgets in the State have remained almost static. Proration, level funding, and acute inflation have severely damaged the ability of the State's academic libraries to provide even a minimal level of academic support so necessary to the maintenance of quality academic programs, particularly at the graduate level.

Concern over these conditions and other issues prompted the Council of Graduate Deans, an advisory council to the Alabama Commission on Higher Education (ACHE), to request that members of the ACHE Council of Librarians and staff of the Commission review the current status of academic libraries of senior institutions in the State. A report of the findings, "University Library Needs for the 80's," was presented at the spring meeting of the Graduate Council in April of 1981. As a result of that presentation and subsequent discussion, the Graduate Council requested the Council of Librarians to prepare a report for its Fall 1981 meeting identifying present and future library needs in the State, focusing in particular on the impact of those needs in support of quality graduate academic programs. The following study is the outgrowth of that request and represents an initial effort in the development of a plan for more effective support and cost efficient use of academic library resources throughout the State.

FUNCTIONS AND ACTIVITIES OF ACADEMIC LIBRARIES

The primary function of the academic library is to provide the books, journals, and other materials necessary to support the academic programs offered at the parent institution. This function involves the following activities:

> Selecting and acquiring as much of the recorded knowledge of mankind as is consistent with the current and anticipated instructional and research needs of library users and within the limitations of available resources.
>
> Organizing and controlling the materials acquired.
>
> Interpreting the collection to users, assisting students and faculty in utilizing the resources of the library, and providing access to needed information located elsewhere.
>
> Making the collection available to users while at the same time preserving materials for the future.
>
> Cooperating with other organizations for the advancement of scholarship and the effective utilization of resources.

The imperative of assuring that the quality and quantity of collections supporting graduate education be maintained becomes obvious in light of the research component which is central to graduate study at all levels and in the majority of fields. Beyond this point, reasonable access to materials is the goal of the academic library. If a student or researcher cannot gain access to certain information on campus, it should be possible for the individual to identify the material in a single database of the holdings of academic libraries in Alabama, a database which should contain not only monographs but serials and non-book materials as well.

PLAN FOR COOPERATIVE RESOURCE SHARING

No single library in the State can supply all the materials needed for all of its programs, nor is it economically and physically practical for all libraries to seek total self-sufficiency. The Council of Librarians is convinced that many of the problematic issues facing academic libraries in Alabama can be solved or significantly reduced only through concerted, cooperative, and unified action involving not only academic librarians themselves but also the administrators of colleges and universities, the Alabama Commission on Higher Education, and the legislative and administrative branches of state government.

It would be most difficult, if not impossible, to formulate a plan for effective resource sharing if a profile of the present academic library system were not developed. The purpose of this study, which is comprised of a series of five reports, is to present an overview of existing resources and an assessment of potential benefits to be derived from cooperative resource sharing. The first three reports deal with an analysis and evaluation of collection development, facilities, and staffing patterns of libraries at each institution according to accepted adequacy formulas and recommended standards. The fourth report addresses statewide bibliographic and physical accessibility and the fifth, computerization of library services.

SCOPE AND FOCUS OF PRESENT STUDY

It is essential that each postsecondary institution offering programs at the two-year, four-year, or graduate level maintain at least a minimum level of adequacy in collection size, staff, and facilities to serve the daily needs of its users. While recognizing these needs, the primary focus of this document will be to evaluate the sixteen libraries at both public and private institutions supporting graduate education.

Data Collection and Analysis

Data was collected from seventeen institutions.* Each library director was responsible for responding to requests for local institutional data. Formulas used to assess adequacy were those which have received broad acceptance within the academic library community.

Media Education

A conspicuous limitation of this document is that assessments of collection and facility adequacy are confined to print materials, primarily books and journals. While acknowledging that audiovisuals are assuming increasing importance in teaching and research, they are notably excluded because they

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*Athens State College does not offer graduate education. It is, however, the only state-supported senior institution in this category. For purposes of completeness in assessing the State's public colleges and universities, data on this institution was included in this study.

are not factors in the formulas applied. At a later time, a study should be undertaken to assess the audiovisual resources of the State's graduate institutions as well.

Branch Campus Libraries

Those institutions which have branch operations both in-state and out-of-state have a unique set of problems in providing appropriate library resources. Among the issues which arose in the development of this study was whether to count these branch campus operations as a part of the main campus library system. A resolution to this question is dependent on a long-range, more extensive planning effort than was warranted at this time. The Council chose to include in-state branch campus operations as part of the evaluation process but to exclude out-of-state operations.

Specialized Libraries

Specialized libraries, such as law or health sciences, are charged specifically with meeting the demands of a particular user. These library collections in Alabama are concentrated in the unique areas of law and health sciences. There is, however, a strong dependency of these libraries on the general library. A concentration, for example, of clinical material would support the medical programs of the institution as well as the health professions in the region. While such a specialized library may require some material in the basic sciences, it relies most heavily on the

collections of the non-specialized library in the parent institution. This is particularly apparent in joint graduate programs such as biomedical engineering, medical psychology, and administration/health sciences where much material used in the academic programs is non-clinical in nature.

Ultimately, the final responsibility for building a comprehensive research collection in all areas rests with the non-specialized library. This type of library must build collections of general materials to support the academic programs in liberal and professional education as well as the basic requirements of the academic programs in the specialized schools.

Although this basic support is not specifically recognized as an integral part of the collection development plan of the non-specialized library, for purposes of this study, the Council chose to include biomedical components in the statistical computations for clarification of the current status of libraries in support of graduate education.

Multi-type Library Networks

The Council is cognizant of the mutual advantages to be gained by working with and sharing the resources of other types of libraries within Alabama. Public library or multi-type library networks are being developed in the State as pilot projects of the Alabama Public Library Service (APLS).

Obvious benefits to such networks and to academic libraries can be derived by sharing access to databases, by creating a joint database of holdings, or by developing a physical delivery system. For example, the Pioneer Alabama Library System (PALS), a multi-type library network in the Northwestern section of the State, has developed a plan, which is under consideration by the Southeastern Library Network (SOLINET), for the creation of a statewide union list of serials. This project is discussed later in Chapter Eight.

For purposes of these reports, statements concerning cooperative ventures are intended to include, unless otherwise stated, those activities that involve the academic libraries of senior institutions which support graduate study.

REPORT NUMBER ONE: COLLECTION DEVELOPMENT

CHAPTER ONE
COLLECTION ADEQUACY

Serious efforts must be devoted to assure that academic library collections are intelligently selected and evaluated, a goal requiring close cooperation between librarians and teaching faculty. The library profession has long sought to develop standard bibliographic and self-study techniques which would provide a framework for measuring the adequacy of collections in support of institutional programs and research. Both qualitative and quantitative measures need to be utilized because each is important to collection development.

Collections are said to have quality for their purposes only to the degree that each "possesses a portion of the bibliography of each discipline taught, appropriate in quantity both to the level at which it is taught and to the number of students and faculty who use it." (ACRL Standards.) The publication of such standard bibliographies as Books for College Libraries by the American Library Asociation and Choice by the Association of College and Research Libraries is representative of the efforts which reflect the emphasis on measures of quality.

Two obvious quantitative measures of collection adequacy as identified by Lancaster are collection size and appropriateness of the collection: "The absolute size of a collection is one characteristic by which it may be evaluated, in that a particular library is unlikely to function effectively if its collection is below a certain minimum size." He further asserts, "this assumes of course, that the collection is appropriate (in terms of subject matter and level of treatment) to meet the needs of the population served and that it is continuing to grow. A large library that stops acquiring new publications will decline rapidly in value." (Lancaster, pp. 165, 168.)

Regional accrediting agencies emphasize that the individual institution should provide collections sufficient for the support of curricular and research needs of the colleges and universities. For instance, the Southern Association of Colleges and Schools standards state--

> . . . . the library is important in the achievement of education goals of students and faculty. To serve the user well, each library must have basic resources to support the institution's purposes and programs. Such resources should be available in a well-equipped facility . . . . Moreover, to facilitate use of such resources, both on and off-campus, a competent professional staff should be available to assist the users. Whatever the format, library materials must be selected, acquired, organized, and maintained to fulfill the institution's purposes and support the educational program.

The question such standards inevitably raise is what qualitative and quantitative measures should be used to

determine whether the library collection and staff are adequate to the task of supporting the research and curricular activities of the parent institution.

FORMULAS FOR ASSESSING COLLECTION ADEQUACY

The Council of Librarians recognizes that over time formulas designed to measure collection adequacy gradually lose their meaningfulness. This is due to a combination of factors, such as changes in publication patterns, delivery of information, teaching and research methodology, and relationships among subject disciplines.

For purposes of this report, three formulas which have broad acceptance in academic librarianship were applied as a measure of collection adequacy. All have been applied to a wide variety of institutions, and all are based on multiple variables. (See Appendices I, II, and III.) Tables of statistics derived from applying these formulas to the seventeen senior institutions in this study are found in Appendices IV, V, and VI.

Each library director was responsible for providing local institutional programmatic data used in the application of these formulas. The Council of Librarians recognized at the outset that a commonality of definitions for these programs has varied throughout higher education and that a definitive list of programs is yet to be presented or universally accepted.

For purposes of data collection in this study, the Council agreed that, with the exception of teacher education programs, institutional programmatic data would be submitted according to the Higher Education Information Survey (HEGIS) classification of major fields. Teacher education data were reported according to the eleven programmatic areas referenced by the National Council for the Accreditation of Teacher Education (NCATE) in the 1979-1980 Annual List of NCATE accredited institutions.

Clapp-Jordan Formula

The Clapp-Jordan formula for minimal collection adequacy was first used in 1965. It was clear from the first applications of this formula that there was a correlation between the degree of collection adequacy and the academic quality of an institution. Nevertheless, the standards applied by the Clapp-Jordan formula were eroded gradually by the much talked about information explosion and the concomitant increase in the need for library support of the curricula.

Clapp and Jordan made a point which should be kept in mind when considering the negative percentages which this study has produced:

> The interpretation to be put on the table [see Appendix IV], therefore, is not that the collections rated minus are in an absolute sense "inadequate," but that they are inadequate in relation to the programs which they are attempting to support--in other words that the institutions have over-extended themselves in relation to the available library resources.

Association of College and Research Libraries (ACRL) Formula

In 1975, ten years after the Clapp-Jordan formula appeared, the Standards for College Libraries were adopted by the American Library Association and its division, the Association of College and Research Libraries. These standards provide not only for the evaluation of collection adequacy but also for staff and facility assessment as well. In addition, the standards also modify the variables used to calculate the number of volumes a library should have in its collection for adequacy and include a clear standard for microforms in calculating the size of a collection. This added sophistication allowed the many young institutions which made an effort to develop retrospective collection strength by purchasing microforms to establish an accurate picture of the health of their collections. At the same time, ACRL also included a formula for calculating the appropriate number of library faculty (i.e., librarians with a terminal MLS degree). It is important to emphasize that while these standards are intended primarily to assess adequacy of libraries supporting baccalaureate and master's programs, they may be applied to libraries serving universities which grant fewer than ten doctoral degrees annually.* The standards do not recognize

*Specifically, the Standards address themselves to institutions defined by the Carnegie Commission on Higher Education as Liberal Arts Colleges I and II and Comprehensive Univerities and Colleges I and II in A Classification of Institutions of Higher Education (Berkeley, California, 1973).

the increased collection requirements for comprehensive doctoral degree granting universities. Thus, the application of the formula understates collection size requirements for such institutions.

Voigt Formula

This formula was designed to identify an appropriate rate of current acquisitions in support of programs and research at comprehensive doctoral granting institutions. The formula provides an adjustment factor for reducing the base rate of acquisitions for institutions with fewer than the formula equivalent number of doctoral offerings. Adjustments to the annual acquisition rate are also made in consideration of first professional degree programs. Hence the inclusion of the University of Alabama at Birmingham and the University of South Alabama in the Voigt formula computations is appropriate.

INTERPRETATION OF FORMULA STANDARDS IN MEASURING ADEQUACY

The search for standards has produced in the past quarter of a century increasingly sophisticated measures and reliable results. While the Clapp-Jordan formula is a time honored instrument, it is no longer capable of assessing the adequacy of collections. Currently, the ACRL formula remains the best available instrument for this task.

Formulas indicate minimal sizes for collections. Lancaster warns that there is a danger that the minimal

standards established by the formulas will be interpreted as optimal levels by those controlling funding of libraries. As a result, in some instances, library acquisitions may be curtailed. Secondly, he states that standards established by the formulas are not only minimal but also are applicable only to the threshold period of an institution's growth. They are to be viewed as a "bread and water" level of adequacy and are not appropriate for the assessment of the adequacy of a collection in a well-established institution. As acquisition rates decline, collections begin to stagnate. Even schools with collections which are adequate in sheer numbers may have holdings which are valuable only for historical research. A library with insufficient current acquisitions and inadequate retrospective collections can support neither the teaching/learning process nor the current research and publication of its academic community.

FINDINGS OF COLLECTION ADEQUACY: Acquisition Rates

As a result of proration, level funding, and severe inflation, most academic libraries in the State have experienced at least a fifty percent decline in their book buying power during the past three years. Many have been forced to institute moratoriums on new serial subscriptions; some have been compelled to cancel significant numbers of existing subscriptions. Tables I and II in Appendix VII show the inflationary increase in costs of library materials and

expenditures of selected libraries for a three-year period. For instance, book prices increased 43.3 percent from 1978-79 to 1980-81 while expenditures for book volumes in Alabama academic libraries declined 17 percent resulting in a net loss of 60.3 percent in actual purchasing power for new titles. Similarly, periodical prices increased 37.1 percent in these years while expenditures increased only six percent. Consequently, Alabama academic libraries experienced a 31.1 percent net decline in periodical purchasing power.

As can be seen in Appendix VI, none of the libraries of the doctoral granting institutions in the state of Alabama maintains currently an annual acquisition rate commensurate with the demands of its advanced degree programs. The clear implication is that assistance is needed to meet the minimum acquisition rate before those libraries are forced to support additional advanced degree programs.

There is at this time no formula for determining acquisition rates which can be applied to the institutions granting degrees only at the baccalaureate and master's level. Studies tend to emphasize a growth rate of at least five or six percent as adequate. These rates should be achieved. However, such a rate does not provide for retrospective strengthening of collections now below adequacy levels. Indeed, given today's limited print runs and publisher warehousing policies, it will become increasingly difficult,

if not impossible, to obtain books even two to three years after the originial publication date.*

Not only does this condition affect current acquisitions, it is almost equally important that the collection analysis proceed promptly, for the results of such studies will guide much more cost effective individual and shared collection development. Without such analysis, academic libraries will continue to build unnecessarily redundant collections. The final overall result will be a wasteful use of resources and even more limited collections.

Collection Size

Statistics displayed in Appendix V reveal that collection adequacy as measured by the Clapp-Jordan Formula was attained by ten of the seventeen libraries surveyed. Only three libraries were adequate based on the ACRL standards, which represent the "state of the art" in formulas.

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*IRS interpretation of the recent U.S. Supreme Court ruling in the Thor Power Tool case has made it unprofitable for publishers and book-jobbers to maintain normal inventories from one tax period to another. Because academic titles have traditionally produced a narrow profit margin, the result will be a reduction in the size of press run and book inventories and probably an even more rapid escalation in materials costs. In short, academic titles which have been available many years after publication go out of print within a short time. Libraries and university faculty have to respond with alacrity to publication schedules or lose the opportunity to obtain titles forever.

ELECTRONIC SECURITY FOR COLLECTIONS

Alabama's academic libraries, like those everywhere in the nation, are plagued by a small number of individuals who steal and multilate the library materials which are the common property and resource of our universities. The literature of librarianship is replete with studies of the woeful progress of their depredations to library collections. Multilated journals, and stolen books and audiovisual materials are commonplace. Moreover, it is among the materials in greatest demand that the heaviest losses are sustained. This means that the losses disproportionately damage the capacity of Alabama's academic libraries to provide the materials needed for teaching and research. To combat this drain on collections, a new security technology has been developed over the last twenty years. Electronic security systems all operate on the same general principles. Egress from the library is controlled so that patrons pass through a security corridor similar to those in airports. A "target" electronically recognizable to the system is installed in each physical volume. Legally circulated books are "desensitized" while books being illegally removed will trigger mild alarms and usually lock turnstiles. At the present time two systems have emerged as the most sophisticated and reliable for protecting library holdings, 3M Company's "Tattle Tape" and the "Checkpoint" system. Librarians have largely favored the 3M system due to its full circulation capability.

This report is not the place to review all the technical and financial arguments over these two competing systems. Rather the position is taken that system compatibility among Alabama's academic libraries is highly desirable as they enter into a resource sharing network.

We know from numerous studies that the installation of security systems is a cost effective means of combating library losses. For instance, University of North Alabama and University of South Alabama have installed the 3M system in 1982. USA has sustained a loss rate of around 350-400 volumes a year and UNA's has been approximately 400 volumes per year. With the average cost of a library book now reaching $20 and the minimum processing cost at $10 per volume, both schools will amortize their security system costs in about three years. More importantly, they will protect their high circulation items and provide better service to students and faculty.

At the present time nine libraries have advanced security systems, including seven with "Tattle Tape", and one each with "Checkpoint" and "Knogo." The latter system is compatible with "Tattle Tape." It is desirable, therefore, to favor a compatible system in future purchases. Five libraries without systems have indicated a desire to acquire them and six with 3M wish to make additions of hardware to better secure their collections or to increase the entry and exit service points for their patrons. The total one-time cost for these additions would be around $900,000. (See Appendix VIII.)

CHAPTER TWO
ALABAMA'S LIBARIES: REGIONAL AND NATIONAL COMPARISONS

In the previous chapter, Alabama's academic libraries are assessed according to widely accepted guidelines: ACRL standards, primarily intended for institutions granting degrees at and below the master's level; and the Voigt formula, designed for comprehensive universities offering doctoral degrees. Another reliable measure of the academic libraries of the State can be obtained by comparing them with colleges and universities in the region offering similar programs.

The collective condition of Alabama's academic libraries can be ascertained by comparing their performance data with those of other states, the region, or the nation. The first section below offers that type of comparison. Assessment of libraries by discrete types, such as the categories employed by the Southern Association of Colleges and Schools, is not possible through the data presented, except for comprehensive universities. Because of the research needs of these latter institutions, their libraries have formed associations at the national and regional levels. The data compiled by these associations provide operational comparisons of Alabama's research libraries with others sharing a similar mission elsewhere. For the other Alabama institutions supporting graduate instruction, the argument is extended by analogy and

is prima facie evidence of the problems of all Alabama academic libraries.

AGGREGATE DATA

As noted In Table II of Appendix VII and Appendix IV based on a total of 73,121 students, ten reporting Alabama libraries spent an average of $56 per student for materials during the 1980-81 fiscal year. During 1977-78, the state-supported institutions of Virginia reported materials expenditures of $71 per student (Virginia State Council of Higher Education, p. 14.) The discrepancy between these figures assumed an even greater significance when the accelerated rates of inflation in recent years are taken into account. (Appendix VII, Table I.)

To lend a national perspective, data submitted by ninety-eight smaller doctoral degree granting institutions to the Association of College and Research Libraries for fiscal year 1978-79 indicated an average expenditure of $73 per student for materials. (ACRL, pp. 11, 13-18.) As noted in Appendix IX, the leading institutions in the Southeast spent an average of $82 per student for materials in 1980.

Aggregate data yield, however, an imprecise measure of the differences between Alabama libraries and their peers. The relative standing of Alabama's research libraries in relation to comparable libraries in the region and the nation provide

a more accurate picture of the condition which characterizes its libraries.

ASSOCIATION OF RESEARCH LIBRARIES (ARL)

The most prestigious library consortium in the United States is the Association of Research Libraries. The most outstanding regional academic library organization in the Southeast is the Association of Southeastern Research Libraries. Libraries supporting Alabama colleges and universities with instructional and research programs of sufficient breadth should aspire to membership in one or both of these organizations. Such affiliations are appropriate because of the mutually beneficial activities in which the members of the association engage, the projects which they sponsor, and the inherent quality of these libraries which membership connotes.

The Association of Research Libraries, an organization of all the major research libraries in the United States and Canada, has been in existence for almost half a century. Its primary function is to identify and solve problems fundamental to large research libraries so that the libraries may effectively serve the needs of students, faculty, and the research community generally. The mission of the Association is to strengthen and extend the capacity of its member libraries to provide the recorded information needed, both now and in the future, by the research community. ARL currently emphasizes four objectives:

1. In response to changing circumstances, it initiates and conducts studies; it develops plans; and it implements specific courses of collective action, on both interim and continuing bases, concerned with the acquisition, organization, preservation, and provision of research library materials, and with the management of research libraries.

2. It seeks the understanding and support of governmental agencies and other appropriate organizations.

3. It cooperates with other educational and professional groups in undertakings of mutual interest.

4. It assembles and distributes information pertinent to research libraries and their services, management, and organization.

Ninety-nine of the current members are academic libraries, representing universities as varied as Harvard, Stanford, University of California at Berkeley, Michigan, Illinois, Kent State, Oklahoma State, and Rice. The remaining members are non-academic libraries, such as the Library of Congress, the New York Public Library, the Newberry Library, and the National Agricultural Library. ARL members in the Southeast include the University of Alabama, Duke, Emory, Florida, Florida State, Georgia, Kentucky, Louisiana State, North Carolina, South Carolina, Tennessee, Tulane, Vanderbilt, Virginia, and Virginia Polytechnic.

As shown above, most of the major institutions of higher education in the Southeast are members of ARL. Of the two largest academic libraries in the State, one, the University of

Alabama, is a member of ARL; the other, Auburn, is not. Besides Auburn, among the schools in the Southeastern Conference only the University of Mississippi and Mississippi State have not qualified for membership.

Membership is open to major university libraries whose collections and services are broadly based. Such libraries are defined by ARL as "those whose parent institutions broadly emphasize research and graduate instruction at the doctoral level and grant their own degrees, which support large, comprehensive research collections on a permanent basis, and which give evidence of an institutional capacity for and commitment to the advancement and transmittal of knowledge." If a university library is to be considered for membership, its parent institution must offer the Ph.D. degree "in a number of fields equal to at least 50 percent of the median number offered by parent institutions of ARL libraries in the year of application." (ARL Newsletter, 1979.) Auburn exceeds this requirement though it is not yet a member of ARL.

In 1979, ARL concluded, by using factor analysis techniques, that ten categories of statistical data best described those characteristics which most ARL members hold in common. Those were number of volumes held, number of volumes added (gross), number of current serials received, number of microforms held, expenditures for library materials, expenditures for binding, total salaries and wages, other

operating expenditures, number of professional staff, and number of nonprofessional staff.

A statistical indexing procedure has been developed to compare libraries on those factors:

> . . . Using principal component analysis, weights are assigned to each variable with the highest weights going to those variables in which ARL libraries are most uniform and lower weights going to those variables where there is more variation among the membership. The weights are calculated from the raw data for each ARL library for a given year, and will change each year.(ARL Newsletter, 1979.)

Membership eligibility requires an academic library to score "within one standard deviation below the mean index score for ARL libraries, i.e., achieve a score of at least -1.00, for each of the four years prior to and including the year of application. (ARL Newsletter, 1979.) Auburn's index score, based on the latest ARL statistical index, was -1.26 for 1979-80 and falls short of this requirement.

Not only must Auburn's position be more fully supported in order for it to become a member of ARL, the University of Alabama's position within ARL must also be strengthened. Membership maintenance requires an index score of at least -1.75. If an ARL member cannot maintain a score greater than that for each of four consecutive years it will not be allowed to continue its membership in the organization. In 1979-80, the University of Alabama achieved an index score of -1.34, ranking 95th among the 99 academic libraries assigned index

scores. While the ARL index does not reflect the quality of the research collection nor the possible vagaries of statistical reporting, the numbers do indicate generally that in the last few years the University of Alabama has appeared at the lower end of the ARL scale as it has struggled to maintain sufficient total collection size in spite of inflation and proration.

Had Auburn been an ARL member in 1979-80, its index score would have placed it between McMaster (91st with a score of -1.13) and Saskatchewan (92nd, with a score of -1.28). Its score and that for the University of Alabama would have placed both major university libraries of the State in the lowest decile of the leading university libraries of the nation. Such a position obviously indicates that neither library can provide library materials or services of sufficient quality or quantity to support adequately strong instructional and research programs for its students and faculty.

The following table, based on 1979-80 data, illustrates further the positions of the University of Alabama and Auburn University in relation to ARL libraries:

TABLE I

COMPARISON OF THE UNIVERSITY OF ALABAMA AND AUBURN UNIVERSITY LIBRARIES TO ARL LIBRARIES

Category	ARL High	ARL Low	ARL Median	UA	AU
Collections					
Volumes in Library	10,082,663	936,864	1,792,048	1,123,802	1,085,467
Volumes Added (gross)	210,448	24,010	67,742	40,189	57,045
Total Microform Units	3,019,186	388,821	1,235,358	796,351	1,305,686
Current Serials	102,199	8,528	19,568	12,511	16,256
Expenditures					
Library Materials	5,001,716	735,946	1,637,405	1,021,860	1,183,677
Current Serials	2,193,964	246,125	904,190	641,472	713,030
Binding	494,462	34,132	108,344	73,325	76,289
Total Materials and Binding	5,496,178	780,971	1,756,497	1,095,186	1,259,966
Total Salaries and Wages	10,428,993	1,114,000	2,730,942	1,464,678	1,195,596
Total Library Operating Expenditures	17,445,634	2,063,108	4,783,864	2,865,023	2,635,669
Personnel (FTE)					
Professional Staff	285	24	61	43	31
Non-Professional Staff	531	50	131	57	61

Sources: For ARL data, including that of the University of Alabama, Association of Research Libraries, ARL Statistics 1979-80, 1980; For Auburn University, Unpublished annual report, 1979-80.

ASSOCIATION OF SOUTHEASTERN RESEARCH LIBRARIES (ASERL)

The Association of Southeastern Research Libraries (ASERL) has a current membership of thirty academic libraries, ranging in diversity from Duke, the University of North Carolina, and the University of Florida to Virginia Commonwealth University, Emory, and Wake Forest. Alabama libraries holding membership in ASERL include the University of Alabama, the University of Alabama at Birmingham, and Auburn University.

The University of Alabama at Birmingham is among the newest of the members of ASERL. Both Auburn and the University of Alabama have been members of the organization for many years; however, none of the three consistently ranks in the upper quartile, or upper half for that matter, on the principal criteria by which ASERL evalautes its membership.

For example, for the 1979-80 fiscal year in the category, "Number of Volumes per Student," Auburn ranks seventeenth of thirty with slightly over 59 volumes per student; Tuscaloosa, 20th (almost 56); and Birmingham, 26th (35). The high score in this category was almost 255 volumes per student; the low slightly less than twenty-nine. The median score was 60; that for the third quartile was 102; and that for the first quartile was 47. In the category of "Periodical Titles per Student," Auburn ranked tenth; University of Alabama, 21st; and University of Alabama/Birmingham, 23rd. A similar pattern was evident in the expenditures for books and periodicals and

total expenditures. In addition, all three schools show a need for additional staff, as indicated by the high number of students per librarian or per staff member. A more detailed analysis of the status of major Southeastern academic libraries is found in Appendix IX.

CHAPTER THREE

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

From an institutional perspective, an overall assessment of seventeen libraries of Alabama's senior postsecondary institutions reveals that historically there has been insufficient funding provided for their material budgets to support the graduate programs offered by their parent institutions. Collection sizes have been below standards of adequacy. Limited bibliographic and physical accessibility have further reduced the effectiveness of most to provide the resources necessary for research and graduate training.

From a statewide perspective, the total holdings of all senior public and private academic libraries supporting graduate education are in excess of seven million volumes. While on the surface this appears to be a substantial figure, it is less impressive when the amount of duplication that exists in books and periodicals is taken into account. Access, therefore, is to a considerably smaller pool of distinct titles. Duplication is necessary at certain levels; findings of the Council of Librarians indicate, however, that insufficient resources have been devoted to maintain minimum adequacy in basic levels of academic support.

From a regional perspective, Alabama's institutions do not compare favorably with others in the Southern Regional

Education Board territory.* Each of the libraries of research and doctoral granting institutions such as the University of Florida (4,331,503 volumes), the University of North Carolina/ Chapel Hill (4,310,940), the University of Georgia (3,935,233), and Duke University (3,553,379) each have at least half as many volumes as the entire state of Alabama.**

While the University of Alabama is committed to maintaining its membership in ARL, its comparative standing reinforces the concern that must be felt in reviewing the application of the standard collection measurement formulas in considering the continuing potential of Alabama's major academic libraries to support graduate education.

Other findings from this study describe more vividly the condition of Alabama's academic libraries, underscore the need to strengthen them, and signal the necessity for implementing a mechanism whereby the resources may be shared statewide.

- During a three-year period from 1978-79 to 1980-81 library expenditures for book volumes declined 17 percent for a net loss of 60.3 percent in actual purchasing power for new titles.
- Academic libraries experienced a 31.1 percent decline in periodical purchasing power from 1978-79 to 1980-81.

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*The Southern Regional Education Board (SREB) is the nation's first interstate compact for higher education created in 1948. There are fourteen member states.

**American Library Directory, 1980.

- According to analyses based on accepted standards, none of the libraries in the doctoral granting institutions maintains currently an acquisition rate commensurate with the demands of their advanced degree programs.

- The average expenditure per student for materials (less that sixty dollars) reported by ten Alabama institutions compares unfavorably with aggregate data from other state, regional, and national sources. Current per student expenditures are 20 percent below 1977 levels reported by state-supported institutions in one southern state.

- None of the Ph.D. granting institutions has more than 68 percent of the materials that the Association of College and Research Libraries (ACRL) standards suggest and serious staff shortages exist in all.

- Only three research institutions of the ten in the Southeastern Conference have not qualified for membership in the Association of Research Libraries: Auburn, University of Mississippi, and Mississippi State. The University of Alabama library which is a member of ARL ranks only 95th among the 99 academic libraries assigned index scores.

- None of the three libraries in the State currently holding membership in the Association of Southeastern Research Libraries ranks consistently in the upper half of the principal criteria on which ASERL evaluates its membership.

RECOMMENDATIONS

In order to alleviate the conditions which currently exist and provide the framework for establishing a resource sharing network, the following recommendations are advanced:

1. Provide for current rates of acquisitions capable of supplying the on-going need for new books and periodicals to support the curricular offerings and research programs of the parent institutions.

2. Sufficient permanent financial support should be provided for Auburn University to quality for membership in the Association of Research Libraries, and both Auburn and the University of Alabama should be funded in a manner that would permit them to rank at the median level among ARL academic libraries. Such funding would ensure their maintaining membership in this organization permanently.

3. Those Alabama academic libraries supporting a wide range of instructional and research programs should have sufficient strength and financial support to enable them to become members of the Association of Southeastern Research Libraries. The University of South Alabama, because of its graduate programs and library collections, is approaching eligibility for membership. Steps should be taken to facilitate that institution's admission into ASERL.

4. Assistance of a permanent nature should be provided to the three existing Alabama members of ASERL to improve their ranking among their peers within this regional organization. An immediate goal of achieving a median level in the major categories of library service, staff, and fiscal support is suggested for all three. The University of Alabama and Auburn University may wish to aspire to a third quartile ranking among their Southeastern colleagues.

5. Using library HEGIS tapes and the computer analysis capability of ACHE, conduct an analysis to establish peer group benchmarks for all other academic libraries in the State which are equivalent to the ASERL and ARL benchmarks to be used by AU, UA, UAB, and USA.

6. Initiate a statewide series of coordinated academic library collection analyses to identify the collection strengths and weaknesses of each academic library. The data gathered from these studies will then support the successful implementation of the following actions.

a. Eliminate existing quantitative and qualitative collection deficiencies through a multi-year retrospective collection development program.

b. Continue, and enhance, a selective retrospective conversion project so that awareness of particularly strong collections can be made available to all.

c. Develop guidelines for a statewide academic library shared collection development policy and procedure.

7. The Alabama Commission on Higher Education in cooperation with an Alabama Academic Libraries Network should develop a reasonable mechanism for reviewing library collection adequacy as part of the process of review and approval of new academic programs. This mechanism would insure that collections adequate to support these programs are in place or will be funded within a minimum of five years from the programs approval.

8. Provide for the installation of compatible security systems in the academic libraries of the state.

a. Install new systems in the five libraries without security.

b. Install additional security equipment in the six libraries requesting improvement in current equipment configurations.

CHAPTER FOUR
STAFF ADEQUACY

Professional organizations and regional accrediting associations emphasize the importance of a library staff of sufficient quantity and quality to meet the library needs of students, faculty, and staff. The current Southern Association standard on the library states:

> The selection, development, and retention of library personnel have a direct bearing on the library's success in achieving its objectives. The number of library personnel and the competencies to be possessed must be based upon the specific objectives which have been established for the library. Professional degrees at the graduate level in library science or learning resources should be held by most professional library staff; however, professional or technical training in specialized services may be appropriate for other library personnel to provide necessary resources and services effectively. There should be an adequate supportive staff to carry out responsibilities of a nonprofessional or technical nature, and qualifications of personnel for these positions should be defined by the institution in terms of the skills needed. (Standards of the College Delegate Assembly, p. 25.)

The Association of College and Research Libraries, in its "Standards for College Libraries," 1975, stresses:

> The library staff shall be of adequate size and quality to meet agreed-upon objectives.
>
> The staff shall comprise qualified librarians, skilled supportive personnel, and part-time assistants serving on an hourly basis.

> The marks of a librarian shall include a graduate degree from an ALA-acredited program, responsibility for duties of a professional nature, and participation in professional library affairs beyond the local campus.
>
> The number of librarians required shall be determined by a formula . . . which takes into account the enrollment of the college and the size and growth rate of the collections.
>
> There shall be an appropriate balance of effort among librarians, supportive personnel, and part-time assistants, so that every staff member is employed as nearly as possible commensurate with his library training, experience, and capability. (Standards for College Libraries, p. 291.)

"Standards for University Libraries," 1979, a joint statement by the Association of Research Libraries and the Association of College and Research Libraries, makes the following comments concerning university library staff requirements:

> A university library shall have a sufficient number and variety of personnel to develop, organize, and maintain such collections and to provide such reference and information services as will meet the university's needs. . . .
>
> The size of a university library's staff is determined by many factors, including the number of physically separate library units, the number of service points requiring staff, the number of service hours provided, the number and special characteristics of items processed . . . , the size of the collections, and the rate of circulation of the collections. Interinstitutional cooperative arrangements may also affect staff size . . . .
>
> A university library should have on its staff a variety of personnel: professional, clerical, and student-assistant staff. The librarians should perform the core academic and professional functions of the library: collection development, reference

> and information services, and substantive activities related to the bibliographic control of materials.
>
> All categories of personnel should have appropriate education and experience, including when necessary, graduate or professional degrees in their particular specialities. (Standards for University Libraries, p. 104.)

LIMITATIONS OF THIS REPORT

This study attempts to assess the quantitative adequacy of the academic library staffs of the sixteen colleges and universities in Alabama supporting graduate education and Athens College, a senior level institution which does not offer graduate programs. (See footnote, p. 18.) These institutions range greatly in scope and in size; accordingly, their libraries vary widely. Although a large number of factors bear upon the quantitative staff requirements of an individual library, the libraries included in this study are assessed, for adequacy of professional staff, by Formula B of the "Standards for College Libraries" (See Appendix II.):

> For each 500, or fraction thereof,
> FTE students up to 10,000 . . . . . 1 librarian
> For each 1,000 or fraction thereof,
> FTE students above 10,000 . . . . . 1 librarian
> For each 100,000 volumes, or fraction
> thereof, in the collection. . . . . 1 librarian
> For each 5,000 volumes, or fraction
> thereof, added per year . . . . . 1 librarian

The other components of quantitative staff requirements are computed from the number of librarians on the following basis (ACRL University Library Statistics 1978-79, p. 12.):

Professional staff as a pecentage of total staff:	25%
Nonprofessional staff as a percentage of total staff:	50%
Student assistants as a percentage of total staff:	25%

Some of the institutions included in this study maintain special libraries for medical, law, and veterinary medical schools. Others maintain branch libraries on the central campus or on branch campuses. These and other variables, noted above, affect staffing requirements. Nonetheless, for the purpose of obtaining a uniform assessment of quantitative staff adequacy, all institutions in the study are measured against the guidelines given above. As in other reports of this study, out-of-state branch campuses are excluded from the analysis.

The quality of the library staff determines to a great extent the quality of library service provided to users. However, this study does not deal with the qualitative adequacy of the staffs, other than to reinforce the emphasis given to the qualitative factors set forth in the various standards cited.

QUANTITATIVE STAFF ADEQUACY

The data used in the analysis of staff adequacy included full-time equivalent student enrollment, collection size, volumes added per year, number of staff positions budgeted, and number of hours worked by student assistants. (See

Appendix X and Appendix XI.) The results of the application for Formula B and the suggested ratio of librarians to other staff members (1:0:2.0) are given in Appendix XII and Appendix XIII.

Table II presents the percentage of adequacy for each of

TABLE II

RANK ORDER AND PERCENTAGE OF QUANTITATIVE FULL-TIME STAFF ADEQUACY[1]

Librarians			Support Staff			Total Full-Time Staff		
Institution	Rank	Percentage	Institution	Rank	Percentage	Institution	Rank	Percentage
Alabama State	1	92%	UAH	1	75%	USA	1	73%
UA	2	87%	USA	2	73%	UAH	2	71%
Jacksonville	3	83%	UAB	3	63%	UA	3	67%
Tuskegee	4	81%	Samford	4	60%	UAB	4	65%
Alabama A&M	5	80%	Auburn	5	58%	Alabama A&M	5	60%
Livingston	5	80%	UA	6	57%	Auburn	6	58%
Athens	7	75%	B'ham Southern	7	54%	Samford	7	57%
UNA	8	73%	Troy	8	51%	Tuskegee	8	50%
USA	8	73%	Alabama A&M	9	50%	Troy	9	49%
UAB	10	68%	Tuskegee	10	36%	Alabama State	10	47%
UAH	11	64%	Livingston	11	30%	B'ham Southern	10	47%
Auburn	12	58%	UNA	12	27%	Livingston	10	47%
Montevallo	13	56%	AUM	13	26%	UNA	13	42%
B'ham Southern	14	50%	Alabama State	14	25%	Jacksonville	14	41%
Samford	14	50%	Montevallo	15	22%	Montevallo	15	33%
Troy	16	45%	Jacksonville	16	21%	Athens	15	33%
AUM	17	29%	Athens	17	13%	AUM	17	27%

[1]Excludes student assistants.

the seventeen institutions for librarians, other staff, and total staff. For librarians, the percentage of quantitative staff adequacy ranges from a high of 92 percent for Alabama State to a low of 29 percent; the median is 73 percent. For quantitative adequacy of other staff, the range is from 75 percent for UAH to 13 percent; the median, 50 percent. Total full-time staff adequacy ranges from 73 percent for USA to 27 percent; the median percentage is forty-nine. These results indicated a wide range in degree of quantitative adequacy among the institutions studied. Staff shortages exist in all of the libraries, and possibly severe staff shortages among a number of the libraries supporting graduate programs in Alabama.

STAFF UTILIZATION ANALYSIS

Another question with which library administrators must contend, besides that of quantitative staff adequacy, is that of proper utilization of the staff. Historically, the full-time staff utilization pattern has typically followed a ratio of one librarian to two other full-time staff members (1.0:2.0). To obtain a measure of the balance between librarians and other full-time staff among the libraries in the study, the ratio of librarians to other full-time staff members was computed for each institution. These ratios are presented, in descending order, in Table III. They range from 1.0:2.4 to 1.0:0.3. Libraries with ratios which depart significantly from 1.0:2.0 may not be able to utilize staff

TABLE III

RANK ORDER AND RATIO OF LIBRARIANS TO SUPPORT STAFF[1]

Institution	Rank	Ratio
Samford	1	1.0:2.4
UAH	2	1.0:2.3
B'ham Southern	3	1.0:2.2
Troy	3	1.0:2.2
Auburn	5	1.0:2.0
USA	5	1.0:2.0
UAB	7	1.0:1.9
AUM	8	1.0:1.8
Alabama A&M	9	1.0:1.3
UA	10	1.0:1.3
Tuskegee	11	1.0:0.9
Livingston	12	1.0:0.8
Montevallo	12	1.0:0.8
UNA	14	1.0:0.7
Alabama State	15	1.0:0.5
Jacksonville	15	1.0:0.5
Athens	17	1.0:0.3

[1]Standard ratio of librarians to full-time support staff--1.0:2.0.

members to best advantage. Also, given the number of librarians on the staff, it appears that several libraries have too few support staff members.

Full-time staff comprise approximately three-fourths of the staff of most academic libraries; the remaining one-fourth of the staff is student assistants who work on an hourly basis. To determine the extent to which library student assistants are being utilized currently in the seventeen institutions of this study, the number of hours worked by student assistants was divided by the full-time equivalent enrollment figure for each institution. The resulting calculations, presented in Appendix XI, indicate relatively heavy reliance upon student assistants at Alabama A&M (10.8 hours worked per FTE student), Tuskegee (9.9 hours), Alabama A&M (8.3 hours), and the Univeristy of Alabama (7.4 hours). Low utilization of student assistants was found at Athens College (0.5 hours worked per FTE student), and a number of the institutions supporting graduate education, including USA (1.1 hours), AUM (1.5 hours), Auburn (3.1 hours), and UAH (3.8 hours).

To determine how many more student assistants, in FTE terms, would be required if each of the libraries were to meet quantitative adequacy, the number of hours worked by student assistants was converted into full-time equivalent staff positions, based on a forty-hour work week and a fifty-week

year. In addition, the figure for total full-time staff needed was divided by one-third. Appendix XIV presents those findings. Most libraries, as expected, need a substantial number of additional student asssistants, but three--Alabama State, Tuskegee, and the University of Alabama--now exceed the level required to meet quantitative adequacy. Perceived trends in federal funding of financial aid to higher education, particularly the college work study program, will dictate a major increase in local institutional support for student assistants or support staff to replace federal money to pay the wages of this component of the staff.

Table IV, which compares the number of librarians and support staff now employed (Appendix X) and number of full-time equivalent student assistants currently utilized (Appendix XIV) with the total staff required to meet the standards, shows that all of the libraries included in this study are understaffed. Current total staff quantitative adequacy ranges from 80 percent at the University of Alabama to 26 percent. The median percentage is 56 percent; the mean, 60 percent. In many instances, the number of staff is too small to provide the kinds of library services necessary to support graduate education, to keep the library open a sufficient number of hours, or to process the materials which faculty and students require.

Although no library was found to be staffed at a quantitatively adequate level, the distribution pattern, by

TABLE IV

TOTAL STAFF REQUIRED TO MEET STANDARDS

Institution	Librarians		Support Staff		FTE Student Assistants		Total Staff		Adequacy	
	Needed	Have	Needed	Have	Needed	Have	Needed	Have	Percentage	Rank
Alabama A&M	15	12	30	15	15	14.1	60	41.1	69%	3
Alabama State	12	11	24	6	12	16.0	48	33.0	69%	3
Athens	4	3	8	1	4	0.2	16	4.2	26%	16
Auburn	53	31	106	61	53	26.0	212	118.0	56%	9
AUM	17	5	34	9	17	3.7	68	17.7	26%	16
B'ham Southern	6	3	12	6.5	6	3.8	24	13.3	55%	10
Jacksonville	23	19	46	9.5	23	14.7	92	43.2	50%	12
Livingston	5	4	10	3	5	2.7	20	9.7	49%	13
Samford	10	5	20	12	10	9.3	40	26.3	66%	6
Troy	22	10	44	22.4	22	14.6	88	47.0	53%	11
Tuskegee	13	10.5	26	9	13	18.6	52	38.1	73%	2
UA	50	43.5	100	57	50	60.3	200	160.8	80%	1
UAB	40	27	80	50.5	40	27.4	160	104.9	66%	6
UAH	14	9	28	21	14	7.8	56	37.8	68%	5
Montevallo	9	5	18	4	9	5.0	36	14.0	39%	15
UNA	15	11	30	8	15	10.0	60	29.0	48%	14
USA	26	19	52	38	26	4.7	104	61.7	59%	8

type of personnel, of the existing staff of each library was evaluated according to the following norm: one-fourth, librarians; one-half, support staff; and one-fourth, student assistants. Appendix XV provides specific information for each institution and, for comparison, also presents the distribution of types of staff among the members of the Association of Research Libraries from 1975-76 through 1980-81.

An examination of the data for the Alabama libraries indicate the presence of two predominate staffing patterns. One major pattern is that of the norm noted above, 25 percent, professionals; 50 percent, support staff; and 25 percent, student assistants. Six libraries were found to follow that pattern even though they fall short of quantitative staff adequacy. The other is a ratio characterized by a disproportionately small percentage of support staff, too large a percentage of librarians, and too large a percentage of student assistants.

CHAPTER FIVE
CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The evaluation of the libraries of Alabama colleges and universities which support graduate work by the standards for quantitative staff adequacy used in this study indicates that:

-- No library is staffed at a quantitatively adequate level.

-- Severe staff shortages exist in a number of libraries. The mix of librarians and support staff among the existing staff indicates too few support staff in several libraries.

-- The degree of utilization of student assistants varies widely among the libraries studied. In some instances, there appears to be too much reliance upon student assistants to perform tasks that should be properly assigned to well trained full-time staff.

RECOMMENDATIONS

The following recommendations are made to improve the quality and quantity of library staffs so that the library needs of students, faculty, and staff will be more satisfactorily met:

-- Begin working immediately to increase the number of staff to meet the level of adequacy suggested by this study.

-- As additions to library staff are made, the mix of librarians, support staff, and student assistants should be changed to approximate a staffing pattern of one-fourth, librarians; one-half, support staff; and one-fourth, student assistants.

-- All categories of personnel should have appropriate education, training, and experience including, when necessary, graduate or professional degrees in their areas of specialization.

REPORT NUMBER THREE: SPACE REQUIREMENTS

CHAPTER SIX
SPACE REQUIREMENTS

DATA COLLECTION

To obtain the data needed for this report, the Council of Librarians conducted a survey in December 1981. The information obtained from the returns of sixteen institutions combined with other data already in the hands of Council, permitted some observations about the space needs of academic libraries in the state of Alabama. (See Table V, p. 62.) Whereas other surveys conducted for this study documented glaring inadequacies in almost every category for most institutions, the space survey showed a wider variance. According to returns, library space was adequate to meet current needs at some institutions, but ranged to very inadequate at others. The conditions of the various institutional libraries, and the formulas used to assess space adequacy are outlined in the following sections.

FORMULAS FOR ASSESSING SPACE NEEDS

Two different formulas were employed to assess space needs. The "Bareither Formula" (Bareither and Schillinger, 1968, pp. 64-66) was selected because of its general

TABLE V

SURVEY OF LIBRARY SPACE

ALABAMA SENIOR INSTITUTIONS OF HIGHER EDUCATION
DECEMBER 1981

INSTITUTION (Type)	NASF ACHE, 1980*	NASF CURRENT TOTAL	NASF TRADITIONAL LIBRARY	NASF INSTRUCTIONAL MEDIA	AV. ACQ. 75-80 BOOKS	AV. ACQ. 75-80 MICROFICHE	AV. ACQ. 75-80 MICROFILM	NO. READER STATIONS	FALL 1980 FTE ENROLLMENT	1980 HOLDINGS VOLUMES EQUIVALENTS
Alabama A&M (R)	36,929	36,929	30,828	6,101	22,564	16,972	506	1,000	4,613	368,245
Alabama State (C)	60,201	60,201	57,793	2,408	8,706	14,837	40	600	3,870	247,017
Athens (C)	12,091	9,986**	8,986	1,000	1,487	110	25	205	851	62,802
B'ham Southern (R)	n/a	32,481	30,631	1,850	3,870	289	174	806	1,292	144,986
AUM (C)	20,401	20,401	18,860	1,541	9,889	57,869	2,887	148	5,091	421,438
Jacksonville (R)	118,822	118,822	116,446	2,376	24,568	63,115	1,087	1,624	6,040	583,911
Livingston (R)	21,162	22,092**	15,838	6,264	5,000	18,000	161	222	973	197,924
Montevallo (R)	59,028	51,160**	51,160	0	4,875	25,471	469	800	2,297	210,901
Troy State (C)	54,403***	65,669**	61,373	4,296	11,781	46,504	1,222	714	7,225	331,243
Tuskegee (R)	n/a	54,833	54,833	0	7,049	2,547	194	624	3,736	255,497
UAB-Sterne (C)	72,289	69,403**	62,000	7,403	38,629	51,628	1,681	450	11,228	798,391
UAB-Lister Hill (C)	43,247	39,249**	37,249	2,000	4,621	1,640	0	390	combined	combined
UAH (C)	47,131	76,000**	68,400	7,600	5,280	10,000	combined	1,200	4,072	287,831
UNA (C)	33,342	34,307**	29,047	5,260	6,979	38,866	200	425	4,573	207,487
USA (C)	55,529	54,403**	51,192	3,216	10,577	19,283	358	506	8,173	368,620
UA (R)	236,749	244,713**	244,713	0	43,394	97,590	combined	4,000	16,443	1,316,508
Auburn (R)	166,222	143,000**	143,000	0	61,007	210,149	combined	1,723	16,845	1,498,125
Samford (R)****	(no response)									

*Data for the ACHE inventory was collected in 1979.
**= variance from ACHE, due to expansion into temporary storage areas or study rooms, the surrender of space to administrative or other needs, or to local recalculations of assignable square footage of library space.
***Main campus and Dothan
****Report not submitted from Samford University, due to building plans and schedules currently in transition, and due to other projected needs for library construction.

acceptance as a space planning instrument on academic campuses. Formula C of the Association of College and Research Libraries (ACRL) was also used. (See Appendix II.) The formula is part of the Standards for College Libraries adopted by the American Library Association and its division, the Association of College and Research Libraries. More recent that the Bareither formula, ACRL Formula C is also more conservative.

The Bareither Formula

The Bareither formula (Table VI) has as its driving factors the size of the book collection and the number of FTE students.

TABLE VI

"BAREITHER FORMULA"

A. Stacks

The recommended standards for stack space are as follows:

First 150,000 volumes:	.1 NASF per bound volume
Second 150,000 volumes:	.09 NASF per bound volume
Next 300,000 volumes:	.08 NASF per bound volume
Over 600,000 volumes:	.07 NASF per bound volume

B. Reader Space

1. 7.5 sq. ft. per FTE undergraduate
2. 7.5 sq. ft. per headcount beg. graduate student
3. 7.5 sq. ft. per advanced graduate student in fields with high research requirements (laboratory disciplines)
4. 15 sq. ft. per headcount advanced graduate student in fields with low research requirements
5. 15 sq. ft. per FTE teaching faculty in departments with low research requirements
6. 3 sq. ft. per FTE for other teaching faculty

C. Service Space

25 percent of reader space, for technical and public service areas (includes office and workroom areas necessary for all administrative and processing functions).

Assuming that progressively denser shelving is possible as collection size increases, the formula calculates space needs at 0.1 net assignable square footage (NASF) per bound volume for the first 150,000 volumes, decreasing in stages to 0.07 NSAF for all volumes in excess of 600,000 volumes. Likewise, the formula assumes differing space needs by type of student, with a range from 7.5 square feet per FTE undergraduate student to 15.0 square for headcount graduate students in certain fields. For the purpose of this study, 7.5 square feet of space per FTE has been used for students at all levels. Finally, library service space for all aspects of library operations (including offices and workrooms) is calculated as 25 percent of required reader space. (Bareither and Schillinger, pp. 64-66).

Association of College and Research Libraries (ACRL)

The ACRL formula (Appendix IIC) calculates reader space needs as 25 square feet per one-fourth of the FTE enrollment on residential campuses, or one-fifth of the enrollment on commuter campuses. (Expressed in the same terms, the Bareither variable would be 30 square feet per one-fourth of the FTE enrollment on all campuses.) Library service space, including office space, is calculated at 25 percent of the space needed for both books and readers. The other driving factor, library holdings, is calculated precisely the same as the Bareither formula (ACRL, "Standards for College Libraries").

NON-TRADITIONAL LIBRARY ACTIVITIES

It is important to recognize that neither formula provides space calculations for non-traditional library activities, such as instructional media, curriculum materials functions, and audio-visual services. While both formulas stress that space needs for these purposes need to be calculated separately, no such computations were made for this study. Inasmuch as thirteen libraries included space allocated to instructional media services in their reports of usable space, the assessment of adequacy is slightly more favorable than might be expected. Had space requirements for non-traditional purposes been included as another driving factor, in at least those thirteen instances, NASF needs would have been higher.

FINDINGS

Using the Bareither formula, five of sixteen libraries (four state-supported and one private) had adequate space. Application of the ACRL formula yielded similar results, with six libraries (five state-supported and one private) receiving adequate marks. In the aggregate, the Bareither formula showed a space deficit of 401,920 net assignable square feet; the ACRL formula showed a deficit of 186,965 net assignable square feet. The difference between the two appears to lie in the slightly more liberal reader space allowance of the Bareither approach.

Using either formula, the aggregate deficits are considerable. (See Table VII, p. 66.) The ACRL deficit, for

example, is larger than any existing library facility in the state, except for the combined libraries of the University of Alabama. The Bareither deficit exceeds the existing seating and storage capacity of both Auburn and the University of Alabama. The deficits translate into gross areas of approximately 531,000 GSF and 247,000 GSF. At an average construction cost (projected to 1983--the earliest possible year of construction) of $88 per GSF, the costs of providing the required space would amount to $46.7 million or $21.7 million, depending upon which criteria were selected.

TABLE VII

CURRENT LIBRARY NASF SPACE DEFICITS

	TOTAL SPACE REQUIREMENTS (BAREITHER)	TOTAL SPACE REQUIREMENTS (ACRL)	TOTAL SPACE REPORTED	DEFICIT BAREITHER	DEFICIT (ACRL)
Alabama A&M	77,208	69,999	36,929	(40,279)	(33,070)
Alabama State	60,013	47,920	60,201	+188	+12,281
Athens	14,259	11,599	9,986	(4,273)	(1,613)
B'ham Southern	26,611	24,592	32,481	+5,870	+ 7,889
Auburn University/Montgomery	85,933	70,031	20,401	(65,532)	(49,630)
Jacksonville	107,840	98,401	118,822	+10,982	+20,421
Livingston	28,436	26,914	22,092	(6,344)	(4,822)
Montevallo	42,016	38,426	51,160	+ 9,144	+12,734
Troy State	98,734	76,155	65,669	(33,065)	(10,486)
Tuskegee	59,520	53,683	54,833	(4,687)	(1,150)
University of Alabama in Birmingham	171,560	136,562	108,652	(61,758)	(27,910)
Sterne			69,403		
Lister Hill			39,249		
University of Alabama Huntsville	65,580	52,855	76,000	+10,420	+23,145
University of North Alabama	63,047	48,755	34,307	(28,740)	(14,448)
University of South Alabama	110,613	85,071	54,408	(52,205)	(30,633)
University of Alabama	256,807	231,116	244,713	(12,049)	+13,597
Auburn	272,592	246,270	143,000	(129,592)	(103,270)
Samford	---	---	---	---	---
TOTAL	1,540,769	1,138,349	1,133,654	401,920	186,965

As only AUM and the University of North Alabama are actively planning new library construction, the pressing statewide library space needs become all the more apparent. Each year, the libraries in the survey add a net of about 400,000 volume equivalents. Assuming that enrollments remain constant on a statewide basis, and excluding attendant service area requirements from the calculations, net collection growth adds approximately 37,600 square feet to the deficit annually. It should be emphasized that the Commission on Higher Education staff stresses that planning should reflect at least ten years of growth. The figures here express current needs only.

THE CONSEQUENCES OF ADEQUACY

As the earlier sections have shown, Alabama's libraries are almost uniformly below all standards of collection adequacy. When space needs are addressed, analysis reveals that in the aggregate Alabama's libraries are ill-equipped to house, or provide access to, their comparatively weak collections. Should resource allocation decisions result in the accelerated growth of library collections, space problems will become even more serious.

In 1981, the ACHE staff prepared an internal study of space needs in the fourteen state-supported schools. Rather than determining space needs based on current materials holdings, recognized as inadequate, the ACRL formula was used to determine the minimum number of volumes each school needed

to support current programs. Space needs were then determined based on the minimum number of required volumes and the current student enrollment. Because the ACHE study omitted certain institutional library components in some instances, the ACHE methodology was reapplied to data collected in this report. At current levels of enrollment, aggregate collection requirements generate a space deficit of almost 600,000 sq. feet (See Table VIII, p. 69.) Optimal acquisition rates at each institution would rapidly compound the deficit.

TABLE VIII

NASF SPACE NEEDS IN STATE-SUPPORTED LIBRARIES BASED ON ACRL COLLECTION STANDARDS

Space As Function of ALA Formula	Totals	AUM	ASU	Athens	Auburn	JSU	UA	UAB	UAH	UM	UNA	USA
vols. requi. by ALA		385245	268000	128815	2469875	349285	814900	241295	362625	2810145	1315620	425590	294755	260485	559845
students		4613 R*	2170 C*	851 C	16845 R	5091 C	6040 R	973 R	2225 C	16443 R	11228 C	4072 C	2297 R	4573 C	8173 C
stack area		15000	15000	11892	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000
		13000	10440		13500	13500	13500	8397	13500	13500	13500	13500	13038	9616	13500
		5460			24000	3671	6792		5010	24000	24000	10046			20468
					130821					119640	50003				
		33900	25440	11892	183221	32171	35292	23397	33510	172140	102593	38646	28038	24616	48968
reader area		23831	19260	4255	105281	25455	27750	6081	36125	102769	56140	20390	14356	23865	40865
service area		15089	11198	4014	72151	14406	18261	7330	17409	68727	39693	14727	10996	11870	22458
total space		72889	55898	20171	360753	72032	91303	36848	87044	343636	198416	73833	52089	59351	112291
current space		39029	60201	9986	143000	43401	113922	22092	65669	244713	108652	76000	51160	34307	54408
deficit	506596	41860	(4213)	10186	217753	51631	(27519)	14756	21375	98923	89764	(2367)	1830	25044	57883

R = residential
C = commuter

CHAPTER SEVEN
CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

At current collection levels, the majority of Alabama academic institutions report space problems. Among the schools reporting deficits under the Bareither formula, the deficiencies ranged from five percent to seventy-six percent. The ACRL formula reflects a similar range.

The aggregate deficit of these institutions is increasing at a rate of 37,600 feet annually, even at net collection growth rates. The space requirements created annually are larger than the current library facilities of six institutions. Only two institutions have library facilities in the active planning stage. The structural and mechanical design of some of the other buildings is not appropriate for current library functions. For example, floors are not strong enough to accommodate audiovisual collections, book stacks, or microfilm cabinets. Thus the available space is not fully usable.

When space requirements are calculated with adequate collections in mind, the current space deficit approaches a staggering 600,000 square feet. A ten-year collection growth projection would increase this figure. Correction of deficiencies of this magnitude could require capital expenditures in the range of fifty million dollars.

RECOMMENDATIONS

1. The space needs of academic libraries in Alabama should be remedied by a large infusion of capital funds.

2. At the state level, the need to house adequately the resources of Alabama's academic libraries should be carefully considered in the development of capital construction priorities.

3. ACHE's Council of Librarians should be encouraged to explore the possibilities of cooperative storage and other models which might serve to ameliorate the pressures on campus library facilities.

4. At the institutional level, it is important tnat library staff and institutional planners develop plans which would establish adequacy under the Bareither or ACRL standards as a matter of institutional priority. Planners should also address the consequences of accelerated acquisition rates upon library space. Universities with central research libraries and one or more branch libraries have library space needs which exceed those indicated by the standard formulas used in this report.

5. The Council of Librarians needs to undertake a statewide analysis of the appropriateness of the structural and mechanical design of older buildings not originally constructed to house library collections.

REPORT NUMBER FOUR: STATEWIDE BIBLIOGRAPHIC AND PHYSICAL ACCESSIBILITY TO LIBRARY RESOURCES

CHAPTER EIGHT
BIBLIOGRAPHIC ACCESS

Two essential elements required in a statewide system of resource sharing among the academic libraries in Alabama are rapid physical access and the willingness of all participants to lend their library materials to the students and faculties of the other colleges and universities. Although working procedures would have to be developed by the members of a statewide academic library system, it is assumed that all parties would agree to the second condition because of their participation in this study. Fortunately, technology is now capable of supporting a statewide resource sharing academic library network which would enable participating institutions to gain access to the collections of other member libraries.

ONLINE COMPUTER LIBRARY CENTER (OCLC)*

Although OCLC is about ten years old, institutions in Alabama have participated in the network since 1975. (See

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*OCLC (Online Computer Library Center) is a not-for-profit computer library service and research organization based in Dublin, Ohio. The Center operates an international catalog network that libraries use to acquire and catalog library materials, order custom-printed catalog cards, arrange inter-library lending and maintain location information on library materials.

Appendix XVI for a list of OCLC members in Alabama.) This system has developed as the most dynamic model of a successful resource sharing cooperative of international scope. Utilization of the network affords bibliographic access to holdings of member libraries for collection development activities and cooperative borrowing. It facilitates the lending of library materials through an interlibrary loan program driven by its established automated communications system. The use of this system by all senior institutions in Alabama would mean that a faculty member or student could be supported by the comprehensive collections of all the State's academic libraries. This does not, however, remove the need for strong collections on each campus, but it could reduce the need for duplicating extensive and expensive collections in highly specialized subjects which could be assigned as the responsibility of individual libraries.

For statewide networking to be successful, all institutions must participate in the cooperative effort. Such activity would require that all institutions become members of the Southeastern Library Network (SOLINET)* and that all institutions support online resource sharing for collection development and interlibrary loan purposes. Success is also dependent upon adding bibliographic and holdings information

*Southeastern Library Network is a regional library cooperative affiliated with OCLC.

for library materials to the OCLC data base. This effort would involve current and future acquisitions as well as retrospective holdings.

CURRENT LEVEL OF NETWORK PARTICIPATION IN ALABAMA

Currently, ten of the seventeen academic libraries in the State are affiliated with the OCLC network through their membership in SOLINET: Alabama State University, Auburn University, Auburn University at Montgomery, Jacksonville State University, Troy State University, University of Alabama, University of Alabama in Birmingham, University of Alabama in Huntsville, University of North Alabama, and University of South Alabama.

To the extent that the ten members of SOLINET have created machine-readable bibliographic and location records of their library holdings, an online union list exists in the OCLC data base. Records in the data base for bound monographic materials are made available to the Alabama Public Library Service (APLS) for inclusion, along with the records of major public libraries and other post-secondary institutional libraries, in a microfilm catalog designated as ALICAT. The ALICAT list, which displays an abridged bibliographic record, is accessible by title only. APLS pays a commercial vendor to maintain the data base and produce the microfilm. APLS has also sponsored the formation of the Alabama Library Information Network (ALIN) which provides interlibrary loan service to public libraries.

The Pioneer Alabama Library System (PALS), a multitype cooperative pilot project in Northwest Alabama funded by a Library Services Construction Act (LSCA) grant and administered by APLS, is proposing a union list of serials project. The project, utilizing the OCLC union list of serials capability, offers the opportunity to create an online union list of serials to volume specificity for libraries in PALS, which includes both the University of Alabama and the University of North Alabama. A companion multi-type pilot project in Northeast Alabama may also participate in the union list of serials. PALS has proposed that other libraries in the State enter with its members in a statewide union list of serials, using the OCLC capability.

Consequently, the machine-readable bibliographic and location records of serial library holdings need only to be entered in the union list (this program is relatively new, therefore, even academic libraries of long standing membership in SOLINET would face some revision of serials records) and the machine-readable bibliographic and location records of monographic library holdings for the remaining seven institutions need only to be utilized to provide statewide participation in a cooperative network. Creation of these records, basic tools for developing a cooperative statewide academic library network, is a function of the local library. Thus, member institutions currently support the basic costs

associated with all functions of the network. Further, if the proposed program were implemented, it would be necessary for current members to bear additional costs for equipment, usage, and staff.

Cost Projections for Network Participation

Projected initial and continuing costs of SOLINET memberships for non-member academic libraries in Alabama is displayed in Appendix XVII. Total first year membership costs for all nonmember libraries, both public and private, would be $193,746. First year costs for the non-member public institutions (Alabama A&M, Athens State College, Livingston University University of Montevallo) would be $108,780; for the non-member private institutions (Birmingham-Southern College, Samford University, and Tuskegee Institute), the cost would be $84,966. In the second year the costs would be reduced to $112,978 for all non-member schools ($64,564 for state supported non-member institutions and $48,414 for privately supported institutions).

Each institution should pay the initial costs for joining SOLINET and accept responsibility for paying the ongoing costs of participating in the bibliographic network. Moreover, all libraries should make a permanent commitment to participating in the shared activities within the State.

RETROSPECTIVE CONVERSION

Retrospective holdings must be added to create a complete record of Alabama academic library holdings. The total number of titles held by academic libraries, both public and private, is 3,652,978. Of these, the state supported institutions have acquired 3,320,883 titles. Eighteen percent, or 670,275 titles of the total number of titles held by the seventeen libraries in this study, has been located and tagged in the OCLC data base. A mammoth conversion project would be required to place the balance of the holdings in machine readable form. The current costs of a conversion project of this magnitude would be $11,696,512 for the state supported schools. (See Appendix XVIII.) This project, once completed, would give Alabama the distinction of being the first state to have all its academic library holdings represented in a single automated catalog.

To estimate the cost of converting retrospective collections, information was gathered to determine the number of titles to be converted, the number of additional staff required, and the additional equipment needed. The synthesis of the information gathered and the following assumptions produced the projected cost of statewide conversion.

A. Conversion would be a two year project;

B. Personnel would be required as follows:

(a) one professional for each 30,000 titles/two year,[1]
(b) one paraprofessional for each 21,000 titles/ two year;[1]

C. One terminal for each 160 man hours available per week;[2]

D. One terminal = 80 hours/week;[3]

E. Professional salary = 18,500/annual + fringe benefits;[4]

F. Paraprofessional salary = 10,500/annual + fringe benefits.[5]

INTERLIBRARY LOAN

The use of a completely developed statewide shared database would permit maximum utilization of the OCLC interlibrary loan subsystem (ILL). This subsystem will allow one institution to borrow from another by using established procedures and an existing communications network. The use of

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[1]UAB Conversion project average rate of conversion = 15,000/ yr for a professional; 10,500/yr for a paraprofessional; these figures allowed for continuation of normal processing.

[2]OCLC available 7-11 CST Monday - Friday 16 x 5 = 80
7-6 CST Saturday 11 11
91

Allows for Monday - Friday availability.

[3]Allows 1 terminal for each person 50 percent of work time.

[4]Average salary of professional librarian - Sterne Library UAB 1980 + 5 percent.

[5]Average salary of paraprofessional staff - Sterne Library UAB 1980 - 5 percent.

the database does carry a charge which is a per transaction cost. Thus, those using the database incur more expense than those not using the service.

The system allows terminal searching as a public service function and is particularly helpful to those doing library research requiring books or serials which are difficult to obtain. It also allows a requesting library to determine if a library in the system owns the title requested and if it is available for loan. This precludes the necessity of preparing written requests and waiting for these to be delivered and returned by U.S. Mail as well as reducing by approximately 50 percent the time lag in obtaining a desired item.

Statewide Borrower's Card

A logical extension of the expanded interlibrary loan program would be the development of a statewide borrower's card. Such a card would allow the faculty and graduate students of the colleges and universities supporting graduate programs to borrow, on site, materials from the libraries of peer institutions.

CHAPTER NINE
PHYSICAL ACCESS

Physical access to the library resources of Alabama academic libraries is possible by using the U.S. postal service, a commercial carrier, or a library system courier service. A key factor in the selection of a delivery service is its cost. Six options were studied; their costs varied greatly.

COMMERCIAL CARRIERS: Purolator, Pony Express, U.S. Postal Service United Parcel

The four options, Purolator, Pony Express, U.S. Postal Service, United Parcel, are commercial carriers. Although not standard to all, cost variables include distance, frequency of delivery, weight, and pickup charges. Purolator charges according to mileage and weight. Pony Express bases its charges on weight and frequency of pickup. The U.S. Postal Service charges a set rate for delivery regardless of distance. United Parcel Service has two zones in the State; consequently, its charges, based on distance and weight, are as follows:

	U.S. Post Office	United Parcel	Pony Express	Purolator
1 lb	.25	$1.19[a] $1.21[b]	$3.64[c] $5.10[d]	$7.80[e] $8.80[f]
5 lbs	.61	$1.56[a] $1.68[b]	$3.64[c] $5.10[d]	$7.80[e] $8.80[f]
10 lbs	.97	$2.02[a] $2.28[b]	$4.39[c] $5.85[d]	$9.00[e] $10.00[f]

In addition, United Parcel Service assesses a $2.50 weekly charge regardless of the number of pickups per week. This additional charge would total $2,210 annually for the seventeen libraries in this study.

Facsimile Transmission

The fifth option, facsimile transmission, allows single sheets of information on paper to be placed on a machine drum and sent via telephone lines to a compatible machine at another location. An analysis was made to provide a basis for comparing the cost of fasimile transmission to that of other methods of sending library material, or surrogates of that material, from one location to another. Details of the analysis follow.

Equipment cost was obtained for a Xerox telecopier, a machine which will transmit a page within twelve to twenty-five

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[a]Zone 2
[b]Zone 3
[c]At least five days a week pickup
[d]Less than five days a week pickup
[e]Within 200 miles
[f]200-300 miles

seconds. The cost for securing the equipment on a rental basis would be $4,680 for each library, or an annual total of $79,560 for all seventeen institutions represented in this study.

Telefacsimile expenses are one-way costs and not round trip charges like those shown in the earlier cost comparison among the post office, UPS, Pony Express, Purolator, and those associated with a library system courier (an analysis of which follows in the next section). Therefore, one-way expenses for the other services were used as a basis for the present comparison. Also, only the one pound rate was used. Telecopying articles of enough pages to weigh more than one pound is questionable because of the staff time which would be involved in the process. Within these constraints, it would require 175,440 transactions via the post office or 35,000 by UPS to exceed telefacsimile costs. Telephone line costs, a three-cent per page reproduction cost to the borrowing library, and staff time used in telecopying were not included in the analysis because the high equipment cost of this option, as compared to the cost of the other options, already appears to make it prohibitive.

Facsimile transmission can be most effective when applied to short articles or single page documents. Transmitting copies of entire books, lengthy journal articles, or information originally in color would be economically impractical.

Such limited use would drive the costs per transaction even higher. Furthermore, because original items could not be loaned by this process, copyright restrictions would still adhere. Consequently, facsimile transmission as the primary means of facilitating physical access is not deemed viable.

Courier Service

Courier service cost, based on two round trips per week from Florence to Mobile, one driver, one vehicle, and associated expenses, is estimated at a current annual rate of $83,600. A cost analysis was made to determine how many one pound, five pound, or ten pound items would have to be borrowed before a courier service would be competitive with the other options. The results of that analysis are presented below:

	U.S. Post Office	United Parcel	Pony Express	Purolator
1 lb	167,200	35,126[a] 34,545[b]	11,483[c] 8,296[d]	5,358[e] 4,750[f]
5 lbs	68,525	26,794[a] 24,880[b]	11,483[c] 8,196[d]	5,358[e] 4,750[f]
10 lbs	43,092	20,693[a] 18,333[b]	9,521[c] 7,145[d]	4,644[e] 4,180[f]

[a] Zone 2
[b] Zone 3
[c] At least five days a week pickup
[d] Less than five days a week pickup
[e] Within 200 miles
[f] 200-300 miles

CHAPTER TEN
CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Success of shared resources is dependent upon sharing of bibliographic databases. The most effective method of sharing a bibliographic database is through the existing network. Not only will such a database drive an interlibrary loan system and cooperative collection development program as discussed earlier, but also it is critical for the implementation of a number of other computer applications in individual libraries and among libraries participating in cooperative programs.

Facsimile transmission was rejected as a means of facilitating physical access to library materials because of excessive costs. Of the five remaining options, speed and reliability are major considerations in choosing a delivery system.

- Pony Express and Purolator are the speediest; both guarantee overnight delivery. However, they are much more expensive than the U.S. mail.
- Courier service is the most expensive method of delivery.
- U.S. Postal Service is the least expensive system. Problems relating to the reliability and speed of this service have been experienced by many libraries, particularly in the areas of interlibrary loan mailings and receipt of book orders.
- United Parcel Service is currently faster and more reliable than the U.S. mail, although its costs are greater.

If other elements of a cooperative academic library system's program, such as a statewide books and periodicals exchange, were handled by a courier, the additional cost might be justified. At this time, however, United Parcel Service or similar commercial service appears to meet most nearly adequately the requirements of a physical access delivery system.

Other factors which govern speed of delivery, besides the delivery medium *per se*, include the speed with which the interlibrary loan request is processed and prepared for shipment and the effectiveness of the borrowing library in returning borrowed materials within the designated loan period. If Alabama academic library interlibrary loan requests are given top priority, the first condition should be met satisfactorily. Prompt return of borrowed materials is especially critical in those instances in which original items are provided instead of photocopy. It will be necessary to lend originals from time to time to comply with the copyright law. Current copyright guidelines now prohibit an institution from borrowing annually more than five photocopied articles of a protected journal title.

RECOMMENDATIONS

1. Establish a computer-based bibliographic record of the holdings of all Alabama academic libraries accessible at each college or university library through the following actions:

a. Secure membership via SOLINET in the Online Computer Library Center (OCLC) for all Alabama academic libraries which are not currently OCLC members.

b. Enter bibliographic and location information for all new acquisitions into the OCLC bibliographic subsystem for each academic library.

c. Enter bibliographic and location information into the OCLC union list of serials holdings subsystem for each academic library's complete serial holdings.

d. Enter bibliographic and location information for selected older materials into the OCLC bibliographic subsystem (i.e., selective retrospective conversion) for each academic library.

2. All academic libraries should join in the development of a statewide union list of serials and begin the creation of machine-readable records in OCLC's union list mode.

3. A graduate borrower's card program should be developed to facilitate the inter-institutional use of library resources by the faculty and graduate students involved in resident graduate programs.

4. Develop an interlibrary loan agreement and a delivery system, probably using United Parcel Service, to facilitate reasonably prompt physical access to Alabama academic library resources for all users of these libraries.

REPORT NUMBER FIVE: COMPUTERIZATION AND NETWORKING

INTRODUCTION

Computerization has become an integral part of much of today's civilized world, and higher education in the United States and Alabama are no exceptions to the force of this development. We have seen the steady growth and application of computer resources in university accounting processes, student records, research activities, and library support, among others. Indeed, experimentation with and discussion of library computerization have been commonplace in academic librarianship for the last twenty-five years. Astounding growth has only been possible in the last ten years, however, as computing capacities have become increasingly sophisticated.

Recent studies have indicated clearly that computerization can assist in controlling the rate of increase of per student library costs. This is a particularly important factor in light of the pressing constraints within which academic libraries have been operating for the last ten years in attempting to support research and teaching. Other reports from this study have described vividly the deteriorating condition of Alabama's academic libraries, underscored the need to strengthen those libraries, and signaled the necessity for

implementing a mechanism whereby the resources of those libraries could be shared statewide.

Computerization can play a key role in achieving these goals because not only can computers help contain rising costs, but computerization can also improve markedly the level of service and support offered faculty and students through academic libraries. In addition, computerization, the explosive development of information services, and the home delivery of information have placed additional stresses on academic libraries as they strive to offer up-to-date service. If libraries cannot meet the challenge of amalgamating these non-traditional information services, faculty and students will suffer even more. Finally, computerization can be the mechanism for enabling the development of cooperative networking activities among Alabama academic libraries--activities facilitated by consistent, coherent, on-going planning and sharing with all benefitting from the joint commitment of funds.

It is the purpose of this report to describe the structure and potential of today's computer technology as it relates to the activities of Alabama's academic libraries in their support of graduate education in the State. The discussion will include the computerization of traditional library services, the recent development of new information services, networks and networking, a conclusion, and recommendations.

Appendix XIX includes a fuller discussion of computer hardware and software. Appendix XX presents two alternatives for computerization: purchase of a turnkey system or in-house software development.

CHAPTER ELEVEN

COMPUTERIZING TRADITIONAL LIBRARY SERVICES

STATE OF THE ART IN GENERAL

Library automation is the use of automatic and semiautomatic computing machines to perform such traditional library activities as acquisitions, cataloging, serials control, interlibrary lending, reference assistance, and public catalog maintenance. Although once computerized these activities are not necessarily performed in traditional ways, the activities themselves are those traditionally associated with libraries: Library automation may thus be distinguished from related fields such as information retrieval, automatic indexing and abstracting, and automatic textual analysis.

Prior to the 1960's, library automation was based on punched-card equipment with computer programs oriented toward business and scientific applications. Equipment was difficult for most libraries to obtain until their parent institutions obtained computers. The capacity for manipulation and analysis of data was small, and there was no provision to store data for later retrieval except on punched cards.

The general purpose computers that became widely available in the 1960's changed all of that and made possible a second

era of library automation systems. Most of the systems common in the 1960's used punched cards for input, so information was fed into the system in a way not very different from unit record systems. Once the data was entered, however, many more operations could be performed during a single processing run. More importantly, the system could now remember by storing information on magnetic tape. Further, the information could be transferred automatically in and out of the computer's "core" storage as needed for complete operations. The speed of operations and the capacity for manipulation and analysis of data were greatly increased, often by several orders of magnitude.

In the early 1970's, another important step was taken with the introduction of online, interactive computer systems. With this development, the philosophy of systems design and the concept of "total library systems" became prominent concerns. The philosophy behind this terminology varied with the system designer. In some cases, it implied that libraries should be automated completely or not at all. Proponents of this theory argued that to automate only one portion of a library's activities was to invite incompatibility with systems that might later be developed for other activities. Others, less radical in approach, used such terms to apply only to design, not to implementation. They argued that the library should be studied as an integrated whole, its entire operations thoroughly understood and flow-charted if possible, and a

complete system designed to automate the whole. The parts of the system could then be implemented one at a time, as funds permitted.

In later years, a variation of the philosophy has appeared in the idea of "integrated technical processing systems." Its proponents argue that good design demands the elimination of redundant keyboarding operations as much as possible, and that in library systems, therefore, bibliographic data entered into the system at the time an item is ordered should be reused if possible, or modified as necessary, to produce various products such as circulation records, microform catalogs, or online public catalogs.

This issue is not yet resolved, though large library systems continue to attempt to integrate functions and move away from redundant data storage and data entry. We are beginning to see today, however, how separate functional systems can be tied together through microprocessor communications switchers, or how minicomputers can use one set of data in several specialized applications.

The basic components of the six major library functions include the following:

Acquisitions

Most automated library aquisition systems are designed to handle the considerable amount of paperwork involved in buying

books. Typically, they print purchase orders; maintain book fund accounts and print book fund reports of various types; provide information on orders outstanding, and sometimes on works in process; and prepare vouchers or checks to pay for the books. Many also print other reports derived from the order information including, for example, lists of orders by order number, claims, or cancellation notices. Most aquisitions systems fall into three broad categories: first, those based exclusively or primarily on automated equipment; second, offline, batch-processing systems using computers; and online systems using various types of remote terminals for communication with a computer.

Circulation

Automated systems for circulation control have been more successful than any other type of library system. There are obvious reasons for this: the operations to be performed are repetitive; the procedures to be followed can be described systematically; and circulation can be separated fairly easily from other library activites. Most importantly, the bibliographic information used in such systems need not be extensive or complex; the severe equipment and programming problems which arise from dealing with complex bibliographic entries, and which have impeded the development of serials, cataloging, and even acquisition systems, are therefore largely avoided.

Uppercase typography is acceptable, and equipment and programming systems that otherwise could not be used are thus available.

Circulation systems are designed to capture and manipulate three kinds of information: information about the borrower, information about the material being borrowed, and information about the loan itself.

After the information has been entered, circulation systems perform some or all of the following functions: provision of information on the location of circulating items; identification of items on loan to a particular borrower or class of borrowers; records of holds or reserves for items on loan but desired by another borrower; printing recall notices and renewals of loans; notification to the library staff of overdue items and printing of overdue notices; notification of delinquent borrowers; calculation of fines and printing of fine notices; calculation and printing of statistics; analysis of summary statistics; and provision for handling special categories of borrowers and special types of materials.

Online Public Catalog

Library public catalogs have for the last fifty years consisted of 3 x 5 card files containing an "index" to the library's noldings. A library catalog lists, arranges, and describes the holdings of a specific library or collection.

The main functions of a catalog are to enable a reader to determine whether the library contains a particular book, and which works by a given author or which editions of a particular work are in the collection. The rules for making catalog entries are, in general, standard rules with national and international acceptance.

An effective catalog of whatever type should possess certain qualities which will enable it to be easily consulted and maintained, and the following criteria can be used for judging a catalog: it should be flexible in terms of addition and removal of information; it should be constructed so that all names and subjects can be quickly and easily found; it should be constructed so that all names and subjects which logically belong together actually do stand together; it should be economically prepared and maintained; and it should be compact.

In considering an online public catalog, we continue to look for the development of catalogs which can maintain continuity, consistency, and the capacity for responding to change. In no other area of library automation has activity been so intense as in the manipulation of cataloging data. Computerized support of this activity has been especially difficult because of the complexity of the information, the fact that all of the subelements of the catalog can be of varying length, the sheer storage necessary to hold over a million bibliographic records with an average record length of

2,000 characters, the number of user searches which the computer would have to handle in any given minute, the difficulty of constructing efficient indexes for such large files, and the necessity for the catalog system to operate in an online, real-time mode can be exceedingly difficult to access efficiently and effectively.

Online Cataloging Systems

In order to share the costs of preparing public catalog records, many academic libraries participate in a second form of online catalog system--customized service networks which provide data bases of public catalog records for users to search, modify individual records for their local use, and obtain a variety of printed and machine readable products showing their localized data. The individual bibliographic records in the databases are most often obtained from the participants or clients and from the Library of Congress as it shares its public catalog records.

The most widely known customized services network is the Online Computer Library Center (OCLC) which supports over 4,000 libraries with a database of more than eight million records. OCLC users add 3,000 new shared cataloging records and 40,000 additional holdings statements to existing records each day.

Serials Control

A great number of separate systems have been devised with the sole purpose of handling this type of material. Such separate serial systems are encouraged by the nature of the material itself. Monographs are received, paid for, cataloged, bound if necessary, and circulated. Serials, on the other hand, continue to be received; they have to be ordered and paid for repetitively; their cataloging data must include additional information, such as the frequency of publication, and all too often the cataloging information must be changed; information on the library's holdings must be constantly updated; and even binding must take place repeatedly and consistently. In all but the very smallest libraries, therefore, special controls are usually needed to handle these procedures.

The lure of controlling all these complexities by machine is not the only attraction of automated serials systems. Traditional library serial records are difficult to consult, but if the information is in machine readable form it can be printed out or accessed conveniently online.

The simplest type of serials system is the straight listing of information regarding each title. Systems which go beyond this function and attempt to automate other clerical procedures involved with the handling of serials usually start with the receiving or checking-in procedure. Claiming,

binding, and routing may also be handled as part of the receiving system, or separately, utilizing the readily updated charateristic of computerized files.

Interlibrary Loan (ILL)

Interlibrary loan as a library function is the process by which libraries borrow from and lend to one another. To ascertain which ILL system is most cost-effective it is necessary to be able to determine what titles any given library owns, and whether the library will share a specific title, to be able to communicate rapidly among libraries, and to be able to transport the books themselves as rapidly as possible.

Although most online circulation systems are located within one library, several libraries have formed an automated interlibrary loan network by interconnecting their circulation databases on a dial-up basis and processing each other's ILL requests. These ILL requests are transmitted from the terminal at the borrowing library, through its own computer and files, to the computer and into the files of the lending library. There are also many network examples of multiple libraries sharing a single stand-alone system, in which the central computer and files are located in one of the member libraries, and the terminals are located in all libraries that are members of the network.

The newest ILL network is that maintained by OCLC. Because the OCLC union catalog contains over eight million records and forty-five million holdings statements, representing an average of six copies of each of the eight million titles, in the majority of instances librarians are able to ascertain where any particular title may be located. OCLC maintains its own nationwide communications system and has designed a computerized message system to allow librarians to communicate rapidly with one another and to borrow from one another through the use of established procedures. Though the physical books have to be delivered by mail or some other method, the use of OCLC for interlibrary loan will reduce the time lag in obtaining a desired item by approximately fifty percent.

Reference

Reference service as provided by reference librarians in major academic libraries is an amalgam of techniques which includes a reference expertise in various subject areas and a thorough knowledge of both general and specialized indexes, abstracts, bibliographies, the holdings of the library, and the library's collection of information source materials. Recent years have seen an increasing library use of independent information databases which can supplement the library's own holdings in providing service to library users.

Online search services were introduced into large academic lioraries less than ten years ago. Although questions related to financing, policy formulation, and planning continue to provoke lively discussions within the profession, the services themselves are now well established as part of public service programs.

Major concerns in the operation of online services focus on several issues. As the number of available databases increases, keeping both staff and documentation up-to-date require constant attention, almost on a daily basis. There is also the need to assure that public services personnel whose responsibilities do not include online searching are kept aware of the range of databases available, and that they understand the online operation sufficiently to be able to suggest its appropriate use. Integrating instruction, and providing for ready reference use of the computer are ongoing needs that may also require special arrangements.

It is likely in the near future, too, that most effective reference service can be provided when local online catalogs, independent information services, local information services, electronic mail and word processing are available to faculty and students by technically and intellectually linking all of these capabilities.

Research library support, in general, is faced today with the necessity not only to automate traditional library services, but also to implement and integrate the new wave of computer-based information services which are being developed rapidly in the for-profit sector.

STATE OF THE ART IN ALABAMA

The six traditional library functions which can be supported effectively by computerization either in whole or in part have been described in Chapter Eleven. Computerization of these functions has been sparse in Alabama's academic libraries and has been centered in activities of the larger libraries or in the slightly more widespread use of OCLC.

There are at least two alternative courses of action in selecting and implementing library computer systems: to computerize each function separately and perhaps attempt to tie the systems together at some later time, or to base the initial system design on the concept of integrating all of the functions into one computerized system. Added to this are two other alternatives: a library may develop its own computer systems, or it may purchase a "turnkey" system already completely developed by some other library or vendor. (There is a fuller discussion of these alternatives in Appendix XX.)

In general, academic libraries undertaking computerization have followed no specific pattern but, rather, have used

whatever combination of these alternatives best suited their institutional environment. The larger the library, however, the greater the interest in computer systems which can intergrate as many functions as possible. Larger libraries generally need to attempt to decentralize access to bibliographic information to both departmental or branch libraries and to departmental offices scattered across larger campuses.

The developmental and planning work being undertaken in the larger Alabama academic libraries, then, has paralleled the national trend and has centered around integrated systems. The University of Alabama at Birmingham pioneered in the late 1970's the initial development of the first two phases (circulation and acquisitions) of an integrated system. Work continues on the remaining functions which this system can ultimately support, particularly an online catalog and serials control. The University of Alabama has received funding this year for the installation of a library computer system and is planning on the implementation of a turnkey, integrated system which will support the major library functions: circulation, acquisition, serials control, and the online public catalog. The University of South Alabama has purchased and begun testing of NOTIS, the integrated library automation system developed by Northwestern University Library. Portions of the following descriptions of Alabama library computerization will reflect the larger library concentration on the implementation of integrated systems.

Acquisitions

Libraries report the computerization of some aspect of the acquisitions process: the University of Alabama at Birmingham, Birmingham Southern, and the University of Alabama at Huntsville. Two other libraries, as part of the implementation of integrated systems, will be able to support acquisitions: the University of South Alabama and the University of Alabama.

Circulation

The University of Alabama in Birmingham has in place a computerized circulation system, and the University of South Alabama and the University of Alabama will be able to include circulation in the implementation of their online systems.

Online Local Catalog and Online National Cataloging Utilities

Three libraries are developing local online catalogs as part of their integrated systems: the University of Alabama at Birmingham, the University of South Alabama, and the University of Alabama.

The use of national online cataloging utilities such as OCLC, however, has been used to a greater degree by Alabama academic libraries. Report Number Four on Statewide Bibliographic and Physical Accessibility has described comprehensively the use of OCLC in Alabama, which only needs to be summarized here:

> "Although OCLC is about ten years old, institutions in Alabama have participated in the network since 1975. Currently ten of the seventeen academic libraries in the State are affiliated with the OCLC network through their membership in SOLINET . . . Consequently, the machine-readable bibliographic and location records of library holdings, a basic tool for developing a cooperative statewide academic library program, needs only to be utilized by the remaining seven institutions to provide statewide participation in this cooperative enterprise. Member institutions support the basic costs associated with all the functions of the OCLC network."

Serials Control

The implementation of serials systems is being developed at the University of Alabama, the University of South Alabama, and the University of Alabama at Birmingham as part of their planned, integrated systems. Auburn University at Montgomery uses their University Computer Center to process serial renewals and a list of serial holdings, as does the University of Alabama in a somewhat related fashion.

Most of the Alabama academic libraries use a serials jobber--EBSCO--to handle a major portion of their serials subscriptions. EBSCO provides service via a nationwide data communications network in which libraries can communicate, order, and claim with EBSCO online. In addition, EBSCO is establishing in cooperative development with Lister Hill Library, University of Alabama in Birmingham, an online serials control system which will perform six major functions online:

check-in, bindery, claiming, accounting, full record display, and public reference display.

Interlibrary Loan

The ten libraries currently participating in OCLC are also able, through that participation, to take advantage at OCLC's interlibrary loan subsystem.

Reference

While reference has long been a traditional library function, computer support in this area has been a recent development and so discussion of reference computerization is included in the next section on recent computerized information services. Suffice it to say here, traditional reference service provided by academic librarians occurs in each of the seventeen academic libraries.

CHAPTER TWELVE

RECENT COMPUTERIZED INFORMATION SERVICES

STATE OF THE ART IN GENERAL

Independent Information Service

In the last ten years an explosion has occurred in the area of information access and delivery. While many of these services are made available to library users with the aid of library staff and equipment, many non-library users have access to independent information services either directly or through other vendors.

Independent information services may be divided into producers (assemblers) and distributors (vendors). The producers are usually small companies that do not have the capacity to sell and service their products; they make agreements with distributors, who are better equipped to handle the marketing and installation of the equipment.

Appendix XXI lists alphabetically major distributors of information databanks with a wide selection of subject matter. While prices are not included here, it is useful to know that some distributors charge by the minute, others by fifteen minute slots; and still others have a minimum-time requirements.

Sometimes more than one databank is offered for the price of one subscription fee.

The contents of these information databanks may consist of either bibliographic citations to journal articles, newspaper articles, or monographs; or of information itself, e.g., demographic data, or newspaper articles.

Many distributors are also called "search service networks" and, as can be seen from Appendix XXI, offer multiple databases or files for searching. The multiple database vendors tend to be commercial companies such as Lockheed, System Development Corporation (SDC), and Bibliographic Retrieval Services (BRS). Together they provide access to over thirty million unique bibliographic records for over 4,000 users. The vendors generally obtain the databases from data base suppliers (mostly the abstracting and indexing services) on a fixed and/or royalty cost basis.

Users generally search one file at a time, unless the files and their indexes have been combined by the search service vendor, and print the results of the search on the local terminal printer during the search process (for a moderate amount of output) or the vendor's high speed printer (for extensive output). This printed output is then mailed to the user. The user price is determined by the particular file selected and the amount of searching, i.e., the amount of time the terminal is connected to the search service computer.

Search services do not provide the ability for users to modify the records in the files, nor do they provide the ability to modify the output. Recently, some pilot experiments have been implemented to capture the search results in machine readable form during the online session for further processing and later display.

Occasionally a database supplier provides the exclusive searching to its own files, e.g., New York Times and National Library of Medicine, becoming in effect a single, database service.

Home Information Retrieval Systems: VIDEOTEX

A giant home information industry is taking shape in the plans of hundreds of companies to develop home information retrieval systems in which subscribers can gain access easily to large amounts of information stored in a computer data base using the existing telephone network as the carrier medium and a modified television set as the receiver.

An adapted television set consists of a box of additional electronic circuitry, a modem, and a plug-in or attached keypad. Controlled by one or more microprocessors, this box of large-scale integrated circuitry features an auto-dialer, an identification number, a character generator, a page store, and an interface board. The interface board allows the set to be connected to the telephone lines. Data is transmitted

to the television from the computer and received from the set. The subscriber uses a keypad to access the desired page of information, to hold a page for viewing, or to cancel the keying instruction.

This concept has not introduced any significant technological developments. Instead it is a new type of environment--an environment that lets people deal with information, not the paper upon which it is written. The industry infrastructure is finally taking shape. Not only is the nation's telephone network being rapidly upgraded to carry videotex's data, but more and more two-way cable TV systems are being built. American Telephone and Telegraph has endorsed videotex by telling its competitors and customers how it is going to design its own system. Twoo, transaction processing in financial services appears to be the trigger application for which the public is willing to pay. Public acceptance is nurtured by more receptivity to such space-age systems and the accelerating purchase of electronic products for the home.

U.S. companies are plunging into every facet of videotex technology to determine which segments of the market to enter: providing the information and services, running the central computer system, interconnecting the customers, or selling the home terminals.

Not only can videotex make banking more convenient, but in this context the biggest threat to newspaper advertising may be electronic advertising. OCLC has been experimenting

in this area and is contracting with libraries which desire to serve as intermediaries in the provision of videotex information.

The following chart summarizes the general elements of the videotex scene today:

INFORMATION AND SERVICE PROVIDERS:

Financial Institutions	Publishers	Retailers	Others
Banc One	Dun & Bradstreet	D. Dalton Booksellers	American Airlines
Chemical Bank	Dow Jones	Com-U-Card	AT&T
Citibank	Harte-Hanks	Federated Dept. Stores	Associated Press
Merrill Lynch	McGraw-Hill	Grand Union	New York Stock Exchange
United American Bank	New York Times	J.C. Penny	
	Readers Digest	Sears, Roebuck	
	Time		
	Times Mirror		

SYSTEM OPERATORS:

AT&T	Dow Jones	Source Teleconputing	Viewdata (AT&T & Knight-Ridder)
CompuServ	Online Computer Library Center	Time	Warner Amex Cable Communications
Cox Cable Communcations	Sammons Cable Communications	Times Mirror Cable	

TRANSMITTERS:

Common Carriers	Cable Companies
AT&T	Cox Cable Communications
	Sammons Cable Communications
Broadcasters	American Television & Communications
	Times Mirror Cable
CBS	Warner Amex Cable Communications
NBC	
Westinghouse Broadcasting	

HOME TERMINAL MAKERS:

Apple Computer	Tandy	Western Electric
Atari	Texas Instruments	Zenith Radio

Local Library Computerized Information Services

Many major academic libraries have already developed or implemented online library systems and are now in the position of being able to create their own local, specialized information databases tailored to meet the needs of faculty and students. In this role the library is both the creator and the vendor. UCLA is a prime example in which library staff not only have built subject databases, but also assist faculty members in the construction of their own files.

Word Processing and Other Special Applications

Word processing is only one of an exploding variety of information-related application programs which can be run on micro and minicomputers. In some instances, the electronic equipment is designed for only one application package, such as word processing or accounting, but in other instances an all-purpose microcomputer can be used to support any number of software-compatible programs.

The programs available in the latter instance can be of great assistance in daily library operations and include, but is not limited to, the following:

- Word processing programs which provide enhanced creation, preparation, and printing of human communications. Word processing programs share some standard capabilities such as clearing computer memory space, entering text, saving files to disk memory, loading files, inserting new material, modifying existing text, finding

and replacing characters and words, deleting material, moving material around in a file, cataloging the desk, and printing the file.

- Accounting programs which include payroll, accounts payable, accounts receivable, general ledger, and inventory.

- Electronic spread sheet programs which can handle the kinds of information that one would normally put in a table with row and column headings. Almost every library manager uses manual spread sheets of some sort to handle various types of business information, from personnel hiring plans to sales projections. The electronic spread sheet programs do all the calculating associated with such information in a fraction of the time.

- Mailing list programs which maintain lists of names and addresses. Any mailing list program will let one add and delete names and addresses, ensuring that the modified list is maintained sequentially, according to whatever criteria specified.

- Database Management Programs (DBMS) which allow the creation of a database and the storage within it of any information to be subsequently retrieved. Such a program can offer on a smaller scale the same feature as the larger online catalogs or online reference services.

- Communications programs which allow the microcomputer to act as a terminal which can interconnect via telephone lines with any computer-based activity that permits dial up access: online catalogs, online reference databases, electronic mail systems and university computers.

- Computer Assisted Instruction (CAI) programs which can be programmed to provide self-help in any education process; either coursework or procedural training, for example.

- There exists a variety of other programs for almost any application including graphics and PERT charts.

Electronic Mail

Electronic mail is a message switching system which utilizes common carrier communication lines for the automatic transmission of mail, messages, and files with delivery in either electronic or printed form instantaneously or for delayed convenience. The commonly available services can automatically record and store all communications online for several days or permanently.

Electronic mail frees one from the constraints of the 8 to 5 workday and office building. Senders and recipients no longer need to keep track of each other's whereabouts. One may send or call for messages at any time and in any place--all that is needed is a phone and an electrical outlet for the other terminal. In addition, messages can be delivered to single users, multiple users, and predefined groups of geographically separate users.

Many libraries and network organizations have begun to use electronic mail for interlibrary loan transactions (either supplementing OCLC or operating independently), for the sharing of reference questions when local reference collections cannot supply the answers, for easily transferring and revising large documents (such as this one), or for general library communications.

STATE OF THE ART IN ALABAMA

Development of computer-based information services and communications techniques in the for-profit sector has exploded in the last five years. Since better service and more effective communications are of interest to academic librarians, there has been widespread movement nationally by libraries toward either the purchase or the vending of these services for use by library clientele.

In addition, the rapid development of microcomputers has made feasible a type of computer literacy and use previously available only to larger libraries and universities. Alabama academic libraries, however, have not been active in these areas, except in the vending of information services.

Information Services (Online Database Searching)

The following institutions provide access to online databases: the University of Alabama, the University of Alabama in Birmingham, Auburn University, the University of Alabama Law Center, the University of South Alabama, the University of North Alabama, and the University of Alabama in Huntsville.

Home Information Retrieval System: VIDEOTEX

No libraries are providing this service, either through direct contract or via OCLC.

Local Library Computerized Library Services

No libraries are providing this service.

Microcomputers and Their Applications

The University of Alabama has an Apple II with software including word processing, electronic spread sheets and graphics, a database management system, RS 232 communications, and a graphics tablet. The University of Alabama Law Center Library uses a TRS 80, model II for office work, totaling bills, and similar activities.

Electronic Mail

No libraries are participating in this type of communication.

CHAPTER THIRTEEN

NETWORKS AND NETWORKING

STATE OF THE ART IN GENERAL

Not only is new technology and information services rapidly changing academic library programs, but the rapid development of networks and networking in the last decade has also had incredible impact. For purposes of this discussion, the term "network" means both the organizations and the systems that link libraries together via telecommunications with computer-controlled message switching and database access.

There are other types of library cooperation which are most commonly called "cooperatives" or "consortia" because these efforts stem from different conditions and have different goals. The significant difference between the former and the latter is the momentous changes that network technology is bringing to libraries.

The concept of library networks emerged in the United States in the mid-1960's as one phase of a longer evolutionary process which has been going on for years. First, the concept of library networks came from a long tradition of cooperation in American librarianship. A second major element in the development of the network concept was the use of automation to handle library routines. A third important factor was

the work that was being done in the early 1960's in the rapidly evolving field of information science and documentation.

The most significant decision that sparked the actual development of library networks was the development of the MARC (Machine Readable Cataloging) formats by the Library of Congress. The existence of consistent formats and standards facilitated the creation and sharing of standard cataloging information and the development of computer-based library systems.

The most successful applications using the MARC tapes in conjunction with online technology has been OCLC. In 1971, OCLC began to provide online service to a single library with one terminal linked to OCLC's single computer. Today OCLC serves nearly 4,000 terminals in nearly 3,000 libraries utilizing a network system requiring a complex of some thirty mainframe and minicomputers--all of this made possible by shared commitment of funds from each of the individual libraries.

Library networks emerged principally as a mechanism to allow rapid technology transfer in the U.S. library system. The economic costs of computer systems development, the increased operating costs of libraries, and the traditional need of libraries to access data in other libraries led to

the idea of a jointly developed central computer network linking many libraries. The larger number of governmental units involved made the creation of a new network organization manadatory. The expense and continuing commitment that computer technology requires made it mandatory that these organizations be formal and legal.

There are two types of such formal organizations, those actually providing computer-based services (e.g., OCLC, RLIN and WLN) and those contracting for computer-based network services (e.g., SOLINET, AMIGOS, OHIONET). Each is typified by role specialization:

Network Organizations Providing	Network Organizations Contracting
Financial Planning	Contracting and Billing for Services
Capital Acquisition	Installation and Training
System Design, Development, Test and Operation	Consulting and Site Planning
Program Development	Monitoring and Feedback
Output Products	Interface With Local and State Systems
System Monitoring	Planning
System Documentation and Network Staff Training	User Products
Research and Development	User Inquiries

The development of these networks has come about almost entirely through initiatives at the state and local level and has been largely self-funded by the participants. In fact,

there exists today some twenty-five functioning network organizations, directly serving over 2,000 libraries from an estimated 3,500 online terminals--all resulting from self-organizing and largely self-financing initiatives.

The range of network services now operational or under development by this broad spectrum of networks, include the following:

- Cataloging
- Acquisitions
- Serial Control
- Union List of Serials
- Catalog Card & Tape Production
- Computer-Output Microform Catalogs
- Accessions Lists
- Authority Control
- Distributed Printing of Bibliographic Records via Terminal Printer
- Management Services
- Automated Circulation
- Automated Interlibrary Loan
- Statistics
- Information Retrieval
- Author, Title and Subject Access to Bibliographic Databases

STATE OF THE ART IN ALABAMA

Formal library networking in Alabama is a fairly recent phenomenon and is exemplified not only by academic library membership in OCLC and SOLINET (see Chapter Eight of this study) but also by cooperative activities fostered by the Alabama Commission on Higher Education and multi-type library cooperation encouraged by the Alabama Public Library Service.

As explained earlier, "networking" is distinguished from "cooperative activities" by the former's reliance on some form of tele-communications with computer-controlled message switching and database access. When using this more focused definition as a benchmark, we find that Alabama academic library networking is limited to ten of the seventeen libraries in this study.

Therefore, while only a portion of our libraries are formal members of a "network," the regional aspect of SOLINET and the national aspect of OCLC were never designed to speak to the specific, programmatic needs of Alabama academic libraries.

So that while it is an absolute necessity for each Alabama academic library to become a member of OCLC (via SOLINET) in order to begin creating machine-readable records, to add library holdings to a nationally accessible database, and

to participate in OCLC's nationally available interlibrary loan system; it is equally as important for Alabama's academic libraries to form their own state network which can speak to specific needs and the methods in which computerization can be of assistance in meeting those needs.

CHAPTER FOURTEEN

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The conclusion to be drawn after comparing the computerization in Alabama's academic libraries to the state-of-the-art across the nation is inescapable--by and large, our academic libraries are only in the earlier stages of automation. The greatest strengths lie with those libraries which are already members of SOLINET and OCLC, and with those three libraries working toward the implementation of integrated, online library systems (UAB, USA, and UA).

Furthermore, the working network is not in place which can guide and support the systems analyses and planning required to effectively take advantage of the efficiency, sophistication, and cost control which computerization offers.

Finally, most of the academic librarians in the State (and most other Alabama librarians too) lack the computer literacy which would facilitate the planning, selection and implementation processes.

These concerns are doubly serious, because not only are we not taking advantage of computerization to support more effectively our traditional library activities, but Alabama's academic libraries also are in no way prepared to deal with the

rapid expansion of telecommunications, electronics, and sophisticated information services. If academic libraries cannot bring these services to their faculty and students, teaching will suffer and research will be greatly impaired. The question now arises as to what strategies should be adopted to begin to bring Alabama's academic libraries into the twentieth century of computing.

First, it is imperative that academic librarians (and other university administrative officers) become fluent and comfortable with a broad range of library computing fundamentals. This aim may be met in a number of ways: special education programs, committee activities involving systems analysis and the introduction of microcomputers into all academic libraries.

Second, it is important that we begin immediately to establish the guidelines and protocols which will standardize our use of OCLC so that the production of future products or the establishment of future union catalogs might be accomplished more easily and cost effectively. An example of this type of guideline can be found in agreeing upon the consistent entry of holdings information in the OCLC record for both serials and monographs. Such guidelines are needed to guide libraries already in OCLC and to be understood by new libraries joining OCLC.

Third, this work can be completed most effectively if we know what we are building toward and have a planning body in place to guide the process. It is important, therefore, for the academic librarians, with the sponsorship and support of their parent institutions, to join in a formal network which will ultimately link together Alabama's academic libraries via tele-communications with computer-controlled message switching and database access. While much network planning can occur on an informal basis with volunteer help, the process of computerization will proceed most expeditiously if there is a network staff person who can guide and continually sustain planning and other network activities. A staff person when combined with well-chosen and clearly charged committees can accomplish an enormous amount of work in a short period of time.

Fourth, any established network must have in hand an understanding of the strategy which can best encompass both statewide cooperation, databases, and library linkage; and the development of local computerized library systems. Both of these systems need to complement one another without being redundant. As discussed in Appendix XX, there are a number of methods for computerizing library activities. What seems to be evolving in other states and regions around the country is the use of a national cataloging utility (in our case, OCLC) for the major union catalog database activities such as a broad union catalog to show general library holdings of monographs

and to act as a serials union list of holdings. Local library systems, however, would be designed and exist specifically to process particular, local library needs such as circulation, acquisitions, local serials holdings and the local online catalog. This illustrates the complementary nature of these two types of development. Interlibrary loan networking can occur through the use of the national utility, OCLC. Or, it can be supplemented by or can exist separately through statewide communications lines using either electronic mail services or state communications networks where they exist.

Within this framework of complementary systems, a national shift toward each library implementing its own local library system, based on its own needs and unique institutional environment, is taking place. Appendix XX also includes a discussion of the tradeoffs among purchasing a turnkey local system, requesting custom development by a vendor, or undertaking development within the local institution. While each library must assess its own needs, in the past five years we have seen a movement away from new startups of local systems developments and toward the purchase of already developed and proven turnkey systems. This latter alternative seems particularly viable for Alabama academic libraries at this time because there are a number of turnkey systems which can operate on micro, mini, or mainframe configurations with minimal installation fuss.

Fifth, once the basic strategy is agreed upon, there is a significant amount of preparatory work which must be undertaken including systems analysis in each library, the preparation of specifications, review of the possible systems, perhaps joint requests for proposals, and, finally, implementation. If the preparatory work has been completed, implementation can proceed immediately, once funds do become available. There are other benefits to undertaking this preparatory work immediately. They include adding to computer literacy; and, reviewing manual procedures, continually existing practices, and policies with possible increase in efficiency immediately. Because the review would be occurring in a network environment, a sharing of experience would enhance the review and learning process.

Sixth, and finally, once the network is established and the preparatory work under way, a natural byproduct of network activity would result in sharing experiences with other networks and in looking beyond the State in seeking solutions to some of our problems. For example, in some other states libraries which cannot afford OCLC or online database searching sometimes either cluster together to share expenses or contract with another library or processing center in the area to undertake the addition of current and retrospective holdings or the searching of information services databases.

With these broad statements in place, we can more easily proceed to specific recommendations.

RECOMMENDATIONS

Continue in the commitment to membership in OCLC and SOLINET for all academic libraries in the State. In addition, as an interim measure, explore the possibilities of "clustering" libraries and/or "contracting for" the inputting of holdings information.

Continue in commitment to OCLC retrospective conversion of major collection strengths or significant collections to facilitate interlibrary loan activities and collection development. In the interim, explore the alternatives of paying a vendor to create MARC machine-readable records and/or undertaking conversion by contracting with other libraries.

Make a commitment to providing access to information services (online database searching) for faculty, students, or other library users. Depending upon the databases searched, hourly prices can range from $15 to $300, though this may be charged to the library user either partially or totally. In addition, as an interim measure, explore possibilities of contracting with other libraries for the provision of this service.

Following a review and selection process, each university should install in each academic library a jointly agreed upon brand of microcomputer with necessary operating software. A basic system can be implemented for approximately $5,000. The network of academic libraries would select one library to serve as a clearinghouse for all purchased and developed software. Installation of microcomputers effects the following benefits:

- Facilitates computer library.
- Supports library management functions.
- Serves as a terminal for the library's use of an electronic mail service or electronic bulletin board or a non-OCLC interlibrary system.
- Serves as a terminal for accessing the independent online information services.

Based upon microcomputer technology and software, develop an Alabama academic library electronic mail system. Software already exists to support this activity so that expense to the library beyond the microcomputer and the software package would be for long distance phone services, most of which can occur in the evening.

Establishment and institutional recognition of a formal Alabama Academic Libraries Network (AALN) charged with the overall goal of linking together Alabama's academic libraries via telecommunications with computer-controlled message switching and database access. While much of the work of the

network can be undertaken with volunteer committees, the implementation of a variety of computer support activities and systems will be expedited through the hiring of a network coordinator who will guide and facilitate planning and other activities. Salary and other supporting funding will cost approximately $50,000 per year to be shared by all academic institutions.

As a network or independent activity, establish a committee to arrive at protocols and guidelines for the consistent recording on machine-readable records of bibliographic holdings information for both serials and monographs.

As a network or independent activity, establish a committee charged with developing a series of computer education programs and seminars. These may be financed by participation fees. Depending upon level of activity, costs may approximate $100 per librarian per year.

As a network or independent activity, establish a committee or committees charged with developing a program for each interested library to begin the necessary preparatory work leading up to system implementation.

As a network or independent activity, establish a committee and hire a consultant to review the necessity for and manner of linking individual local library integrated systems as they come into existence. The consultant's report will

become part of the computerization master plan and will cost approximate $2,000.

As a network or independent activity, establish a mechanism to review alternatives for system implementation including, for example, clustered use of turnkey or locally developed systems.

Finally, while much can be accomplished through the activities of volunteers and committees, it is important that institutions recognize that additional financial support is necessary for travel, food, photocopying, and so forth when undertaking such a major planning effort. Any involved committee member will probably require $1,000 of supporting funds per year.

APPENDICES

APPENDIX I

CLAPP-JORDAN FORMULA AND WEIGHTING .

FORMULA FOR ESTIMATED THE SIZE FOR LIMINAL ADEQUACY
OF THE COLLECTIONS OF SENIOR COLLEGE AND UNIVERSITY LIBRARIES

(1)	Books		Periodicals		Documents	Total
	Titles (2)	Volumes (3)	Titles (4)	Volumes (5)	Volumes (6)	Volumes (7)
To a basic collection, viz.:						
1. Undergraduate library	35,000	42,000	250	3,750	5,000	50,750
Add for each of the following as indicated:						
2. Faculty member (full-time equivalent)	50	60	1	15	25	100
3. Student (graduate or undergraduate in full-time equivalents)	--	10	--	1	1	12
4. Undergraduate in honors or independent study programs	10	12	--	--	--	12
5. Field of undergraduate concentration-"major" subject field	200	240	3	45	50	335
6. Field of graduate concentration - Master's work or equivalent	2,000	2,400	10	150	500	3,050
7. Field of graduate concentration - Doctoral work or equivalent	15,000	18,000	100	1,500	5,000	24,500

*Source: Verner W. Clapp and Robert T. Jordan, "Quantitative Criteria for Adequacy of Academic Library Collections," College and Research Libraries, XXVI (September, 1965).

APPENDIX II

ASSOCIATION OF COLLEGE AND RESEARCH LIBRARIES (ACRL)*
FORMULAS AND WEIGHTING**

FORMULA A

The formula for calculating the number of relevant print volumes (or microform volume-equivalents) to which the library should provide prompt access is as follows (to be calculated cumulatively):

1.	Basic Collection	85,000 vols.
2.	Allowance per FTE Faculty Member	100 vols.
3.	Allowance per FTE Student	15 vols.
4.	Allowance per Undergraduate Major or Minor Field	350 vols.
5.	Allowance per Masters Field, When No Higher Degree is Offered in the Field	6,000 vols.
6.	Allowance per Masters Field, When a Higher Degree is Offered in the Field	3,000 vols.
7.	Allowance per 6th-year Specialist Degree Field	6,000 vols.
8.	Allowance per Doctoral Field	25,000 vols.

A "volume" is defined as a physical unit of any printed, typewritten, handwritten, mimeographed, or processed work contained in one binding or portfolio, hardbound or paperbound, which has been cataloged, classified, and/otherwise prepared for use. For purposes of this calculation, microform holdings should be included by converting them to volume-equivalents. The number of volume-equivalents held in microform should be determined either by actual count or by an averaging formula which considers each reel of microform as one and five pieces of any other microformat as one volume-equivalent.

FORMULA B

The number of librarians required by the college shall be computed as follows (to be calculated cumulatively):

For each 500, or fraction thereof, FTE students up to 10,000	1 librarian
For each 1,000 or fraction thereof, FTE students above 10,000	1 librarian
For each 100,000 volumes, or fraction thereof, in the collection	1 librarian
For each 5,000 volumes, or fraction thereof, added per year	1 librarian

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*Source: "Standards for College Libraries," College and Research Libraries News, XXXVI (October, 1975)

**For purposes of data collections in this report, with the exception of teacher education programs, institutions, submitted programmatic data according to the Higher Education Information Survey (HEGIS) classification of major fields. In teacher education, institutions reported according to the eleven programmatic areas specified by the National Council for the Accreditation of Teacher Education (NCATE).

Appendix II
Association of College and Research Libraries (ACRL)
Formulas and Weighting (cont.)

FORMULA C

The size of the college library building shall be calculated on the basis of a formula which takes into consideration the size of the student body, requisite administrative space, and the number of physical volumes held in the collections. In the absence of consensus among librarians and other educators as to the range of non-book services which it is appropriate for libraries to offer, no generally applicable formulas have been developed for calculating space for them. Thus, space required for a college library's non-book services and materials must be added to the following calculations:

a. Space for readers. The seating requirement for the library of a college wherein less than fifty percent of the FTE enrollment resides on campus shall be one for each five FTE students; the seating requirement for the typical residential college library shall be one for each four FTE students; and the seating requirements for the library in the strong, liberal arts, honors-oriented college shall be one for each three FTE students. In any case, each library seat shall be assumed to require twenty-five square feet of floor space.

b. Space for books. Space required for books depends in part upon the overall size of the book collection, and is calculated cumulatively as follows:

	Square Feet/Volume
For the first 150,000 volumes	0.10
For the next 150,000 volumes	0.09
For the next 300,000 volumes	0.08
For holdings above 600,000 volumes	0.07

c. Space for administration. Space required for such library administrative activities as acquisition, cataloging, staff offices, catalogs, and files shall be one-fourth of the sum of the spaces needed for readers and books as calculated under (a) and (b) above.

This tripartite formula indicates the net assignable area necessary for all library services except for non-book services. (For definition of "net assignable area" see "The Measurement and Comparison of Physical Facilities for Libraries," produced by ALA's Library Administration Division. Libraries which provide 100 percent as much net assignable area is called for by the formula shall qualify for an A rating as regards quantity; 75-99 percent shall warrant a B; 60-74 percent shall be due a C; and 50-59 percent shall warrant a D.

APPENDIX III

VOIGT FORMULA VARIABLES AND WEIGHTING

Quantitative Factors

The suggested quantitative factors to be used in the model are as follows:

		No. of Volumes
M.1	Acquisition rate of currently published materials for a university as defined (for purposes of this model, currently published materials are defined as books or journals published in the year received or in the previous year. Thus, in 1975, currently published materials bear either 1974 or 1975 publication dates.)	40,000
M.2	Subtraction rate per field for fewer than two European literatures, or three social sciences or if psychology or philisophy are not included	1,000
M.3	Addition rate per field for additional advanced graduate programs in foreign literatures, social sciences, earth sciences (geology), and astronomy.*	2,000
M.4.	Addition rates for advanced graduate professional schools or subjects:	
	Agriculture	5,000
	Architecture	1,000
	Art	3,000
	Business Administration	2,000
	City and Regional Planning	2,000
	Drama	2,000
	Education	3,000
	Engineering	1,000
	per major area maximum	4,000
	Law	8,000
	Library Science	1,000
	Medicine	8,000
	Medicine-Related Professions	1,000
	per major area maximum	4,000

*Subject to certain limitations.

Appendix III
Voigt Formula Variables and Weighting (cont.)

Music	3,000
Oceanography	3,000
Religious Studies	2,000
Veterinary Science	2,000

(It is assumed that related pure science materials exist in the 40,000 bases, thus reducing the requirements in medicine, veterinary science, engineering, oceanography, and agriculture to the levels indicated; that social science materials help support business administration, city and regional planning, education, and law; that the base allocation helps support a architecture, music, art, drama, and library science; that philosophy helps support religious studies; and that requirements for all other areas are included within the totals for the campus.)

M.5	Addition for undergraduate students. For each 2,000 undergraduate students or fraction thereof, over 5,000 undergraduate students	1,000
M.6	Addition for sponsored research. For each $15 million in sponsored research contracts or grants	1,000
M.7	Addition for lack of access to other research libraries:	
	Travel time, more than one hour each way, to a research library of 2 million or more volumes	0
	Travel time, less than one hour each way, to a major research library	10,000
	Travel time, more than two hours each way, to a major research library	20,000

Source: Melvin J. Voigt, "Acquisition Rates in University Libraries," College and Research Libraries (July, 1975).

APPENDIX IV

COLLECTION ADEQUACY STUDY OF ALABAMA SENIOR INSTITUTIONS
BASED ON FALL 1980 DATA*

Institution/FTE Enrollment Rank	Collection Adequacy Assessment		
	Formula Volumes Required	Actual Volumes Held**	Comparison % Difference
Alabama A&M/4613 - 8			
Clapp-Jordan Standards	229,171	354,299	+55%
ACRL Standards	368,245	365,704	-1%
Alabama State University/3870 - 11			
Clapp-Jordan Standards	162,200	204,769	+26%
ACRL Standards	266,000	247,017	-7%
Athens State College/851 - 17			
Clapp-Jordan Standards	25,167	62,802	+2%
ACRL Standards	118,815	62,802	-47%
Auburn University/16,845 - 1			
Clapp-Jordan Standards	2,028,660	1,237,366	-39%
ACRL Standards	2,468,875	1,488,125	-40%
Auburn University at Montg/5091 - 7			
Clapp-Jordan Standards	191,222	418,792	+119%
ACRL Standards	345,885	421,438	+22%
Birmingham Southern College/1292 - 15			
Clapp-Jordan Standards	87,136	144,733	+66%
ACRL Standards	125,010	144,986	+16%
Jacksonville State Univ./6040 - 6			
Clapp-Jordan Standards	231,086	460,873	+99%
ACRL Standards	384,900	583,911	+52%
Livingston University/973 - 16			
Clapp-Jordan Standards	127,036	140,881	+11%
ACRL Standards	243,295	197,924	-19%

*Two formulas were used to prepare this assessment, both appearing in the American Library Association publications. The Board of Directors of ALA, Association of College and Research Libraries on July 3, 1975, approved "Standards for College Libraries" which was published in College and Research Libraries News, Vol. 36, No. 9, October 1975, pp. 277-301. The Clapp-Jordan formula was published by Verner W. Clapp and Robert T. Jordan "Quantitative Criteria for Adequacy of Academic Library Collections", College and Research Libraries, Vol. 26 No. 5, September 1965, pp. 371-380.

**Statistics for "Actual Volumes" were the result of different techniques for counting microform materials required by the ACRL and Clapp-Jordan formulas. Specifically, Clapp-Jordan counted only fully cataloged microforms while ACRL counts a ratio of one volume to a reel of microfilm or five microfiche. However, reporting libraries did not indicate cataloged microforms, and fiche were not a common format at the time the Clapp-Jordan formula was developed (1965). Therefore, in actual practice, microfilm reels were counted on a one to one ratio as volumes for both formulas. This no doubt inflates the "Actual Volumes" statistic for Clapp-Jordan comparison, casting the size of collections in a somewhat better light than required by the formula. Fiche was excluded from calculations for the Clapp-Jordan formula.

Appendix IV
Collection Adequacy Study (cont.)

Institution/FTE Enrollment Rank	Collection Adequacy Assessment		
	Formula Volumes Required	Actual Volumes Held**	Comparison % Difference
Samford University/3,360 - 13			
Clapp-Jordan Standards	151,749	164,075	+8%
ACRL Standards	231,900	197,283	-15%
Troy State University/7,225 - 5			
Clapp Jordan Standards	241,296	257,619	+6%
ACRL Standards	362,625	331,243	-9%
Tuskegee Institute/3,736 - 12			
Clapp Jordan Standards	232,112	242,547	+4%
ACRL Standards	289,740	255,497	-12%
University of Alabama/16,443 - 2			
Clapp-Jordan Standards	1,775,432	1,165,597	-34%
ACRL Standards	2,309,145	1,316,508	-43%
University of Alabama/Birmingham/*** 11,228 - 3			
Clapp-Jordan Standards	1,103,006	674,359	-39%
ACRL Standards	1,315,620	798,391	-39%
University of Alabama/Huntsville/ 4,072 - 10			
Clapp-Jordan Standards	348,414	263,283	-24%
ACRL Standards	425,580	287,831	-32%
University of Montevallo/2,297 - 14			
Clapp-Jordan Standards	176,538	152,831	-13%
ACRL Standards	294,755	210,901	-29%
University of North Alabama/4,573 - 9			
Clapp-Jordan Standards	172,881	163,560	-5%
ACRL Standards	256,845	207,487	-19%
University of South Alabama/8,173 - 4***			
Clapp-Jordan Standards	358,798	237,089	-34%
ACRL Standards	555,845	322,826	-42%

*** Statistics for the University of Alabama at Birmingham and the University of South Alabama include the biomedical components of those institutions.

APPENDIX V

FORMULA ADEQUACY PERCENTS ARRAYED
BY INSTITUTION IN RANK ORDER
BASED ON FALL 1980 FTE

Clapp-Jordan Formula Collection Adequacy % Enrollment Rank ( )	AOKL Formula Collection Adequacy % Enrollment Rank ( )
Auburn University at Montgomery +119% (7)	Jacksonville State University +52% (6)
Jacksonville State University +99% (6)	Auburn University at Montgomery +22% (7)
Birmingham Southern College +66% (15)	Birmingham Southern College +16% (15)
Alabama A&M University +55% (8)	Alabama A&M University -1% (8)
Alabama State University +26% (11)	Alabama State University -7% (11)
Livingston University +11% (16)	Troy State University -9% (5)
Samford University +8% (13)	Tuskegee Institute -12% (12)
Troy State University +6% (5)	Samford University -15% (13)
Tuskegee Institute* +4% (12)	Livingston University* -19% (16)
Athens State College +2% (17)	University of North Alabama -19% (9)
University of North Alabama -5% (9)	University of Alabama/ Huntsville -32% (10)
University of Montevallo -9% (14)	University of Alabama/ Birmingham -39% (3)
University of Alabama/ Huntville -24% (10)	Auburn University -40% (1)
University of Alabama 34% (2)	University of Montevallo -42% (14)
University of South Alabama -34% (4)	University of South Alabama -42% (4)
Auburn University -39% (1)	University of Alabama -43% (2)
University of Alabama/ Birmingham -39% (3)	Athens State College -47% (17)

*Median institution.

APPENDIX VI

VOIGT FORMULA ACQUISITION RATES*

Institution	Voigt Acquisition Rate	Actual Acquisition Rate	% Difference
Auburn University	80,000	55,000	-31%
University of Alabama	93,000	40,189	-57%
University of Alabama/ Birmingham**	72,000	45,012	-37%
University of Alabama/ Huntsville	41,000	9,189	-78%
University of South Alabama**	61,000	18,231	-70%

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* Source: Melvin J. Voigt, "Acquisition rates in University Libraries," College and Research Libraries, Vol. 36 No. 4, July 1975, p. 263-271.

** Both UAB and USA acquisition rate figures include the biomedical components in these institutions.

APPENDIX VII

THREE YEAR PROFILE OF INFLATIONARY COSTS
AND LIBRARY EXPENDITURES

TABLE I

INFLATION IN LIBRARY MATERIALS COSTS

	Average Book Cost	% Increase Books	Average Cost Per Journal	% Increase Over Previous Year
1978-79	$18.21	12.3%	$30.37	10.1%
1979-80	22.37	22.8%	34.54	13.7%
1980-81	24.21	8.2%	39.13	13.3%
Cumulative Increase	$ 6.00	43.3%	$ 8.76	37.1%

The data for books were drawn from figures published annually by Blackwell North America. This information is based on the 20,000-25,000 new academic titles treated in BNA's approval plan system each year. Periodical statistics are those provided each year in the Library Journal study "Price Indexes for . . . U.S. Periodicals and Serial Services."

TABLE II

SELECTED LIBRARY EXPENDITURES 1978-81

	1978-79	1979-80	1980-81	Total Change
Books	$2,045,828.52	$1,981,419.50	$1,707,112.07	-17%
Periodicals	1,979,410.72	2,212,756.44	2,101,607.97	+ 6%
AV	74,011.00	74,747.00	69,664.45	- 6%
Binding	218,565.30	269,014.40	218,870.05	0%
Other Exp.	5,309,494.68	6,002,947.76	6,047,987.59	+12%
TOTAL	$9,627,310.22	$10,540,885.10	$10,145,242.13	+ 5%

Table II represents the expenditures of ten academic libraries in the state of Alabama including: Auburn University, Birmingham-Southern College, Livingston University, Troy State University, University of Alabama, University of Alabama/Birmingham, University of Alabama/Huntsville, University of Montevallo, University of North Alabama, University of South Alabama. Data on the remaining four public institutions was not submitted and the three private institutions included elsewhere in this study, were excluded from this table on the grounds that they are not involved in the state funding process.

APPENDIX VIII

ACADEMIC LIBRARY ELECTRONIC SECURITY SYSTEMS

Library Security Systems	3M Tattle Tape	Check Point	Knogo	No Systems
Survey Results	7	1	1	7
Libraries Wishing To Purchase 3M Hardware	No System 5	Add to Present 3M System 6		
Exit Gates Needed	Number 20	Approx. Cost $800,000		
Entrance Gates Needed	Number 16	Approx. Cost $16,800		
Volumes To Be Targeted	Number 677,000	Approx. Cost* $47,930		

*This represents only materials cost, not the considerable labor cost incurred by a library installing targets.

APPENDIX IX

STATUS OF MAJOR SOUTHEASTERN ACADEMIC LIBRARIES
JUNE 30, 1980*

School**	Enrollment		Volumes			
	Headcount	Rank	Total	Rank	Number Per Student	Rank
Tennessee	30,401	1	1,356,000	9	44.60	24
Florida	30,092	2	1,794,000	6	59.62	16
Louisiana State	26,986	3	1,822,000	5	68.53	13
South Carolina	26,006	4	1,622,000	8	62.37	14
Georgia	25,677	5	1,985,000	3	77.31	10
Kentucky	22,950	6	1,636,000	7	71.28	12
Memphis	21,386	7	776,000	22	36.29	25
Florida State	21,157	8	1,282,000	11	60.59	15
North Carolina	21,060	9	2,225,000	2	105.65	6
VPI	20,780	10	1,226,000	12	59.00	18
Georgia State	20,338	11	662,000	24	32.55	29
South Florida	19,291	12	555,000	27	28.77	30
Louisville	19,238	13	637,000	26	33.11	27
North Carolina State	19,196	14	967,000	18	50.38	23
Miami	18,489	15	988,000	17	53.44	21
Auburn	18,329	16	1,085,000	14	59.20	17
Alabama	16,919	17	946,000	19	55.91	20
VCU	16,692	18	550,000	29	32.95	28
Virginia	15,029	19	1,943,000	4	129.28	4
Alabama/Birmingham	14,214	20	502,000	28	35.32	26
Duke	12,115	21	3,085,000	1	254.64	1
Mississippi State	11,374	22	649,000	25	57.06	19
Georgia Tech	11,246	23	989,000	16	87.94	9
Vanderbilt	10,850	24	1,192,000	13	109.86	5
Clemson	10,788	25	801,000	20	74.25	11
Tulane	10,080	26	1,031,000	15	102.28	8
Mississippi	9,535	27	500,000	30	52.44	22
William and Mary	6,851	28	703,000	23	102.61	7
Emory	5,514	29	1,334,000	10	241.93	2
Wake Forest	4,736	30	781,000	21	164.91	3
Number		30		30		30
High	30,401		3,085,000		254.64	
Q3	21,271		1,629,000		102.45	
Mean	17,231		1,187,467		79.14	
Median	18,409		1,010,000		60.11	
Q1	11,048		682,500		47.49	
Low	4,736		500,000		28.77	
Recommended Minimum Standard***					100.00	

*Based on "Association of Southeastern Research Libraries, Annual Statistical Survey," January 1981.
**Rank by Enrollment.
***For a library which supports an average of ten Ph.D.'s per year; issued in 1965.

Appendix IX
Status of Major Southeastern Academic Libaries (cont.)

School**	Periodicals				Book Budget Bks., Pers., Bndg.	
	Titles Rec'd	Rank	Titles Per Student	Rank	Amount	Rank
Tennessee	21,866	4	.72	14	1,413,000	8
Florida	21,790	5	.72	14	2,789,000	1
Louisiana State	18,578	7	.70	16	2,464,000	2
South Carolina	12,967	13	.50	22	NA	NA
Georgia	32,086	1	1.25	6	1,024,000	17
Kentucky	31,866	2	1.39	4	1,543,000	7
Memphis	4,954	26	.23	29	805,000	23
Florida State	10,278	17	.49	23	1,680,000	5
North Carolina	28,273	3	1.34	5	1,672,000	6
VPI	13,083	12	.63	19	2,040,000	3
Georgia State	4,992	25	.25	28	952,000	19
South Florida	5,463	24	.28	26	973,000	18
Louisville	4,451	30	.23	29	1,063,000	15
North Carolina State	13,395	9	.70	16	1,337,000	9
Miami	10,935	16	.59	20	944,000	20
Auburn	16,256	8	.89	10	1,127,000	13
Alabama	8,934	20	.53	21	836,000	22
VCU	4,580	29	.27	27	438,000	29
Virginia	13,392	10	.89	10	1,827,000	4
Alabama/Birmingham	6,977	23	.49	23	610,000	27
Duke	20,865	6	1.72	3	1,211,000	11
Mississippi State	8,601	21	.76	12	784,000	25
Georgia Tech	11,313	14	1.01	9	1,068,000	14
Vanderbilt	11,150	15	1.03	8	1,035,000	16
Clemson	13,390	11	1.24	7	886,000	21
Tulane	7,645	22	.76	12	679,000	26
Mississippi	4,650	28	.49	23	791,000	24
William and Mary	4,674	27	.68	18	570,000	28
Emory	9,859	18	1.79	2	1,323,000	10
Wake Forest	9,796	19	2.07	1	1,190,000	12
Number		30		30		29
High	32,086		2.07		2,789,000	
Q3	17,417		1.14		1,510,500	
Mean	12,902		.81		1,209,390	
Median	11,043		.71		1,065,500	
Q1	6,220		.39		848,500	
Low	4,451		.23		438,000	
Recommended Minimum Standard***			1.00			

**Rank by Enrollment.
***For a library which supports an average of ten Ph.D.'s per year; issued in 1965.

Appendix IX
Status of Major Southeastern Academic Libraries (cont.)

School**	Book Budget		Total Budget			
	Amt. Per Student	Rank	Amount	Rank	Amt. Per Student	Rank
Tennessee	46.48	25	4,078,000	9	134.14	22
Florida	92.68	8	5,822,000	1	193.47	14
Louisiana State	92.68	8	5,378,000	3	202.29	12
South Carolina	39.38	27	3,311,000	12	127.32	27
Kentucky	67.23	18	4,113,000	7	179.22	17
Memphis	37.64	28	2,268,000	23	106.06	29
Florida State	79.41	13	4,096,000	8	193.60	13
North Carolina	79.39	14	5,674,000	2	269.42	7
VPI	98.17	5	4,960,000	5	238.21	8
Georgia State	46.81	24	2,629,000	18	129.27	26
South Florida	50.44	22	2,575,000	19	133.48	23
Louisville	55.26	20	2,868,000	16	149.08	21
North Carolina State	69.65	15	3,553,000	10	185.09	15
Miami	51.06	21	2,993,000	15	161.88	19
Auburn	61.49	19	2,759 000	17	150.53	20
Alabama	49.41	23	2,243,000	24	132.57	24
VCU	26.24	29	2,194,000	25	131.44	25
Virginia	121.57	3	5,099,000	4	339.28	4
Alabama/Birmingham	42.92	26	1,682,000	28	118.33	28
Duke	99.96	4	4,768,000	6	393.56	3
Mississippi State	68.93	16	1,873,000	26	164.67	18
Georgia Tech	94.97	7	3,062,000	14	272.27	6
Vanderbilt	95.39	6	3,494,000	11	322.03	5
Clemson	82.13	12	2,291,000	21	212.37	11
Tulane	67.36	17	2,287,000	22	226.88	9
Mississippi	82.96	11	1,750,000	27	183.53	16
William and Mary	83.20	10	1,521,000	29	222.01	10
Emory	239.93	2	3,085,000	13	559.48	1
Wake Forest	251.27	1	2,554,000	20	539.27	2
Number		29		29		29
High	251.27		5,822,000		559.48	
Q3	94.40		4,108,750		261.62	
Mean	81.87		3,274,828		219.68	
Median	74.52		3,027,500		189.28	
Q1	50.60		2,288,000		137.88	
Low	26.24		1,521,000		106.06	
Recommended Minimum Standard***	50.00				150.00	

**Ranked by Enrollment.
***For a library which supports an average of ten Ph.D.'s per year; issued in 1965.

Appendix IX
Status of Major Southeastern Academic Libraries (cont.)

School**	Professional Staff			
	Number of Librarians	Rank	Ratio Libns. to Students	Rank
Tennessee	45	11	1 to 676	26
Florida	68	2	1 to 442	14
Louisiana State	51	8	1 to 521	19
South Carolina	46	10	1 to 565	21
Georgia	63	3	1 to 408	12
Kentucky	60	5	1 to 383	10
Memphis	29	23	1 to 737	28
Florida State	49	9	1 to 432	13
North Carolina	74	1	1 to 286	6
VPI	56	7	1 to 371	9
Georgia State	29	23	1 to 701	27
South Florida	30	22	1 to 643	25
Louisville	36	13	1 to 534	20
North Carolina State	34	17	1 to 565	21
Miami	36	13	1 to 514	18
Auburn	31	20	1 to 591	23
Alabama	34.5	16	1 to 490	16
VCU	18	27	1 to 927	30
Virginia	62	4	1 to 242	4
Alabama/Birmingham	16	29	1 to 888	29
Duke	59	6	1 to 205	3
Mississippi State	41	26	1 to 506	17
Georgia Tech	22.5	12	1 to 274	5
Vanderbilt	35	15	1 to 310	7
Clemson	17	28	1 to 636	24
Tulane	31	20	1 to 325	8
Mississippi	24	25	1 to 397	11
William and Mary	15	30	1 to 457	15
Emory	34	17	1 to 162	2
Wake Forest	33	19	1 to 144	1
Number		30		30
High	74		1 to 144	
Q3	54		1 to 318	
Mean	39		1 to 478	
Median	35		1 to 474	
Q1	27		1 to 613	
Low	15		1 to 927	

** Ranked by Enrollment.

Appendix IX
Status of Major Southeastern Academic Libraries (cont.)

School**	Support Staff: Number of Support Staff	Rank	Ratio Support Staff per Student	Rank
Tennessee	135	4	1 to 225	15
Florida	77	15	1 to 391	29
Louisiana State	78	13	1 to 341	25
South Carolina	89	11	1 to 292	22
Georgia	151	2	1 to 170	8
Kentucky	105	7	1 to 219	14
Memphis	83	12	1 to 258	18
Florida State	90	10	1 to 235	16
North Carolina	155	1	1 to 136	6
VPI	108	6	1 to 192	11
Georgia State	61	19	1 to 333	24
South Florida	71.5	17	1 to 270	19
Louisville	58	21	1 to 332	23
North Carolina State	103	8	1 to 186	9
Miami	78	13	1 to 237	17
Auburn	65	18	1 to 282	21
Alabama	45	26	1 to 376	27
VCU	61	19	1 to 274	20
Virginia	149	3	1 to 101	3
Alabama/Birmingham	27	29	1 to 526	30
Duke	132	5	1 to 92	2
Mississippi State	29.5	28	1 to 336	28
Georgia Tech	55	23	1 to 204	13
Vanderbilt	98	9	1 to 111	5
Clemson	58	21	1 to 186	9
Tulane	73	16	1 to 138	7
Mississippi	26.5	30	1 to 360	26
William and Mary	35	27	1 to 196	12
Emory	50	25	1 to 110	4
Wake Forest	54	24	1 to 88	1
Number		30		30
High	155		1 to 88	
Q3	104		1 to 154	
Mean	80		1 to 242	
Median	75		1 to 230	
Q1	55		1 to 333	
Low	26.5		1 to 526	

**Ranked by Enrollment.

Appendix IX
Status of Major Southeastern Academic Libraries (cont.)

School**	Total Staff: Number of Staff	Rank	Ratio--Staff to Students	Rank
Tennessee	180	5	1 to 169	17
Florida	145	8	1 to 208	25
Louisiana State	129	13	1 to 206	24
South Carolina	135	11	1 to 193	22
Georgia	214	2	1 to 120	9
Kentucky	165	6	1 to 139	12
Memphis	112	15	1 to 191	20
Florida State	139	9	1 to 152	15
North Carolina	229	1	1 to 92	6
VPI	164	7	1 to 127	10
Georgia State	90	21	1 to 226	29
South Florida	101.5	17	1 to 190	19
Louisville	94	20	1 to 205	23
North Carolina State	137	10	1 to 140	13
Miami	114	14	1 to 162	16
Auburn	96	18	1 to 191	20
Alabama	79.5	24	1 to 212	27
VCU	79	25	1 to 211	26
Virginia	211	3	1 to 71	4
Alabama/Birmingham	43	30	1 to 331	30
Duke	191	4	1 to 64	2
Mississippi State	52	27	1 to 219	28
Georgia Tech	96	18	1 to 117	8
Vanderbilt	133	12	1 to 82	5
Clemson	75	26	1 to 144	14
Tulane	104	16	1 to 97	7
Mississippi	50.5	28	1 to 189	18
William and Mary	50	29	1 to 137	11
Emory	84	23	1 to 66	3
Wake Forest	87	22	1 to 54	1
Number		30		30
High	229		1 to 54	
Q3	155		1 to 107	
Mean	119		1 to 157	
Median	108		1 to 157	
Q1	82		1 to 206	
Low	43		1 to 331	
Recommended Minimum Standard***			1 to 80	

** Ranked By Enrollment.
***For a library which supports an average of ten Ph.D.'s per year; issued in 1965.

APPENDIX X

LIBRARY DATA FOR DETERMINING QUANTITATIVE STAFF ADEQUACY

Institution	FTE Enrollment[1]	Holdings[2]	Volumes Added[1]	Full-Time Staff[3] Professional	Support	Total	Ratio of Librarians to Other Staff
Alabama A&M	4,613	365,704	1,099	12	15	27	1.0:1.3
Alabama State	3,870	247,017	4,703	11	6	17	1.0:0.5
Athens	951	62,802	375	3	1	4	1.0:0.3
Auburn	16,845	1,488,125	55,000	31	61	92	1.0:2.0
AUM	5,091	421,438	4,439	5	9	14	1.0:1.8
B'ham Southern	1,292	144,985	2,723	3	6.5	9.5	1.0:2.2
Jacksonville	6,040	583,911	17,692	19	9.5	28.5	1.0:0.5
Livingston	973	197,924	4,454	4	3	7	1.0:0.8
Samford	3,360	197,283	5,000	5	12	17	1.0:2.4
Troy	7,225	331,243	14,682	10	22.4	32.4	1.0:2.2
Tuskegee	3,736	255,497	7,615	10.5	9	19.5	1.0:0.9
UA	16,228	1,316,598	40,189	43.5	57	100.5	1.0:1.3
UAB	11,228	798,391	47,118	27	50.5	77.5	1.0:1.9
UAH	4,072	287,831	9,189	9	21	30	1.0:2.3
Montevallo	2,297	210,901	4,068	5	4	9	1.0:0.8
UNA	4,573	207,487	6,671	11	8	19	1.0:0.7
USA	8,173	368,620	21,400	19	38	57	1.0:2.0

Average ratio of librarians to other staff--1.0:1.5

[1]1979-80 fiscal year data.
[2]Appendix IV.
[3]1981-82 fiscal year data.

APPENDIX XI

NUMBER OF HOURS WORKED BY STUDENT ASSISTANTS--FY 1979-80*

Institution	Hours	FTE	Hours worked per FTE Student	Rank
Alabama A&M	28,148	4,613	10.8	1
Tuskegee	37,120	3,736	9.9	2
Alabama State	32,000	3,870	8.3	3
UA	120,640	16,228	7.4	4
B'ham Southern	7,502	1,292	5.8	5
Livingston	5,400	973	5.5	6
Samford	18,633	3,360	5.5	6
Jacksonville	29,368	6,040	4.9	8
UAB	54,804	11,228	4.9	8
Montevallo	10,050	2,297	4.4	10
UNA	20,032	4,573	4.4	10
Troy	29,199	7,225	4.0	12
UAH	15,600	4,072	3.8	13
Auburn	52,044	16,845	3.1	14
AUM	7,436	5,091	1.5	15
USA	9,306	8,173	1.1	16
Athens	400	851	0.5	17

*There is an implicit danger in the heavy reliance on students inasmuch as Federal support, a primary source of funding for student wages, is being dramatically reduced.

APPENDIX XII

ADDITIONAL FULL-TIME STAFF REQUIRED TO MEET STANDARDS[1]

Institution	Librarians	Support Staff	Total Staff
Alabama A&M	3	15	18
Alabama State	1	18	19
Athens State	1	7	8
Auburn	22	45	67
AUM	12	25	37
B'ham Southern	3	6.5	9.5
Jacksonville	4	36.5	40.5
Livingston	1	7	8
Samford	5	8	13
Troy	12	21.6	33.6
Tuskegee	2.5	17	19.5
UA	6.5	43	49.5
UAB	13	29.5	42.5
UAH	5	29.5	34.5
Montevallo	4	14	18
UNA	4	22	26
USA	7	14	21

[1]"Standards for College Libraries, Formula B." Ratio of Librarians to Other Staff--1.0:2.0.

APPENDIX XIII

LIBRARIANS REQUIRED TO MEET ACRL FORMULA B

	Librarians Required			
Institution	FTE	Holdings	Volumes Added	Librarians
Alabama A&M	10	4	1	15
Alabama State	8	3	1	12
Athens State	2	1	1	4
Auburn	27	15	11	53
AUM	11	5	1	17
B'ham Southern	3	2	1	6
Jacksonville	13	6	4	23
Livingston	2	2	1	5
Samford	7	2	1	10
Troy	15	4	3	22
Tuskegee	8	3	2	13
UA	27	14	9	50
UAB	22	8	10	40
UAH	9	3	2	14
Montevallo	5	3	1	9
UNA	10	3	2	15
USA	17	4	5	26

APPENDIX XIV

STUDENT ASSISTANTS (FTE) REQUIRED TO MEET QUANTITATIVE STANDARDS[1]

Institution	Need	Have	Balance
Alabama A&M	15	14.1	0.9
Alabama State	12	16.0	-4.0
Athens State	4	0.2	3.8
Auburn	53	26.0	27.0
AUM	17	3.7	13.3
B'ham Southern	6	3.8	2.2
Jacksonville	23	14.7	8.3
Livingston	5	2.7	2.3
Samford	10	9.3	0.7
Troy	22	14.6	7.4
Tuskegee	13	18.6	-5.6
UA	50	60.3	-10.3
UAB	40	27.4	12.6
UAH	14	7.8	6.2
Montevallo	9	5.0	4.0
UNA	15	10.0	5.0
USA	26	4.7	15.3

[1]One-third of total full-time staff needed.

APPENDIX XV

DISTRIBUTION OF CURRENT TOTAL STAFF

	Professional		Support		Student (FTE)	
	No.	Pct.	No.	Pct.	No.	Pct.
Alabama A&M	12	29%	15	37%	14.1	34%
Alabama State	11	33%	6	18%	16	49%
Athens	3	71%	1	24%	0.2	5%
Auburn	31	26%	61	52%	26	22%
AUM	5	28%	9	51%	3.7	21%
B'ham Southern	3	22%	6.5	49%	3.8	29%
Jacksonville	19	44%	9.5	22%	14.7	34%
Livingston	4	41%	3	31%	2.7	28%
Samford	5	19%	12	46%	9.3	35%
Troy	10	21%	22.4	48%	14.6	31%
Tuskegee	10.5	27%	9	24%	18.6	49%
UA	43.5	27%	57	35%	60.3	38%
UAB	27	26%	50.5	48%	27.4	26%
UAH	9	24%	21	55%	7.8	21%
Montevallo	5	36%	4	28%	5.0	36%
UNA	11	38%	8	28%	10.0	34%
USA	19	31%	38	61%	4.7	8%
Total	228	28%	332.9	42%	238.9	30%
ARL Libraries[1]						
1975-76		27%		53%		20%
1976-77		26%		53%		20%
1977-78		26%		53%		21%
1978-79		25%		52%		21%
1979-80		25%		53%		21%
1980-81		25%		53%		22%

[1] ARL Statistics 1980-81 (Washington, D.C.: Association of Research Libraries, 1981), p. 6.

APPENDIX XVI

OCLC MEMBERS IN ALABAMA

OCLC Network

Oakwood College
Huntsville

Stillman College
Tuscaloosa

Talladega College
Talladega

Tuskegee Institute
Tuskegee

Miles College
Birmingham

FEDLINK Network

TVA National Fertilizer
Development Center
Muscle Shoals

U.S. Army Corps of Engineers
Mobile

U.S. Army
Fort Rucker

SOLINET Network

Alabama Department of Archives & History
Montgomery

Alabama Public Library Service
Montgomery

Alabama State University
Levi Watkins Learning Center
Montgomery

Alabama Supreme Court and State
Law Library
Montgomery

Auburn University
Auburn

Auburn University at Montgomery
Montgomery

Birmingham-Jefferson Library
Birmingham

Jacksonville State University
Jacksonville

Mobile Public Library
Mobile

University of Alabama Library
University

Spring Hill College
Mobile

Troy State University
Troy

Appendix XVI
OCLC Members in Alabama (cont.)

SOLINET Network (cont.)

U.S. Air Force
Air University Library
Maxwell AFB

University of Alabama in Birmingham
Birmingham

University of Alabama in Birmingham
Health Sciences
Birmingham

University of Alabama in Huntsville
Huntsville

University of Alabama
Library School
University

University of North Alabama
Florence

University of South Alabama
Biomedical Library
Mobile

University of South Alabama Library
Mobile

APPENDIX XVII

INITIAL AND CONTINUING COSTS OF SOLINET MEMBERSHIPS
FOR NON-MEMBERS ACADEMIC LIBRARIES (PROJECTED)

	STATE**	PRIVATE***	TOTAL
*Initial membership	$16,016	$15,402	$31,418
2 terminals/institution	29,600	22,200	51,800
Terminal maintenance/1st yr.	3,936	2,952	6,888
Estimated telecommunications	13,680	10,260	23,940
10/FTU's & cards/institution	8,280	6,210	14,490
I.L.L 2500 transactions/inst.	13,400	10,050	23,450
Searching for public use	20,000	15,000	35,000
Tape Subscription Services	3,868	2,892	6,760
Total Costs	$108,780	$84,966	$193,746
Year 2 to Year N	64,564	48,414	112,978

*Replaced after first year with $350/institution annual membership, or $1,400 state and $1,050 private.

**Alabama A&M, Athens State College, Livingston University, University of Montevallo

***Birmingham Southern College, Samford University, Tuskegee Institute.

APPENDIX XVIII

RESOURCES REQUIRED FOR STATEWIDE BIBLIOGRAPHIC CONVERSION (PROJECTED)

	STATE	PRIVATE	TOTAL
Titles to be converted	2,648,102	334,601	2,982,703
Professional staff needed	89	12	101
Clerical staff needed	127	16	143
Terminals needed	55	7	62
Costs			
Terminal	254,320	32,368	286,688
FTU*	5,482,192	692,624	6,174,186
Professional Staff	3,293,000	444,000	3,737,000
Paraprofessional Staff	2,667,000	336,000	3,003,000
Total (Dollars)	$11,696,512	$1,504,992	$13,201,504

*The first time use charges are a maximum. These charges can be modified to the extent that a library is able to conduct its retrospective conversion during prime time hours.

APPENDIX XIX

COMPUTERS AND COMPUTING

INTRODUCTION

Hardware for computer processing involves equipment which can perform the following functions: data preparations, input to the computer, processing, secondary or auxiliary storage, and output from the computer. Equipment may be online, i.e., connected directly to the computer, or offline.

Software consists of nonhardware aids, namely computer programs and computer routines which facilitate the operation of the computer by the user installation. These aids consist of computer programs for standard tasks such as sorting data records, organizing and maintaining files, translating programs written in a symbolic language into machine language instructions, and scheduling jobs through the computer. The term can include user programs, but more commonly refers only to general programming and operating programs which are made available from the hardware manufacturer or from independent software companies. Software is as vital to effective use of a computer as the hardware.

A program consists of a set of instructions to the computer to perform operations which accomplish a processing task. A data processing job may require a number of programs.

The user normally writes his or her own programs for applications unique to the installation. However, generalized applications programs can be purchased or leased from software organizations. Computer processing may be performed periodically in batch mode or immediately in realtime mode. Some computer systems may be shared by many users simultaneously. This is termed "time sharing."

In batch processing, data to be processed is accumulated over a period of time. The accumulated batch is then processed periodically. This method is very efficient, but its use means that there is always a processing delay.

In realtime processing, each transaction is processed as soon as it is received. There is no waiting to accumulate a batch of transactions. Realtime processing is used especially in situations such as a computerized reservation system or an online catalog where an immediate response is required.

Time sharing is the concurrent use of a single computer system by many users, each of which has an input/output device and can access the same computer at the same time. The computer gives each user a small, but frequently repeated, slice of the time, so that each user gets an almost immediate response.

Equipment In A Computer Installation

The equipment that is found in a specific computer

installation will depend on the amount and type of processing being performed and on the types of equipment available with the model of computer being used. In general, a computer system will have a central processing unit (CPU), plus one or more units of equipment for the functions of secondary storage, data preparation, input, and output.

The central processing unit (CPU) is the "computer" part of the computer system. It contains an arithmetic unit for computation, a control unit, and the primary storage (also called the "main or internal memory"). The primary storage usually contains the program being executed and the data required by that program. The control unit fetches instructions from the storage, decodes them, and directs the various equipment units to perform the specified functions. The arithmetic unit performs all arithmetic, comparisons, and data manipulation. There is a control consol or control panel for operator use.

Also called "auxiliary storage," secondary storage is supplementary to the primary storage associated with the central processing unit. It is used to hold programs and data files and has large capacity storage relative to the primary storage. When a data record or program is to be used in processing, it is copied from the secondary storage into the primary storage. After processing, the updated record is returned to the auxiliary storage. Punched cards

can be used for secondary storage, but magnetically encoded storage media are usually more desirable. Data can be written on a magnetic surface, read as many times as necessary and then used again by writing new records in place of the old records. The most popular magnetic storage media are magnetic tape and magnetic disc.

Sizes of System

Computer systems range in size from microcomputer to minicomputer to mainframe computer, each passing day the sophistication of electronic technology increases and the features which used to distinguish the sizes of computers become more and more blurred.

Though the current computer processors are much the same type of processor that was designed some twenty-five years ago, technology has advanced from vacuum tubes to solid state devices (transistors), to integrated circuits, to medium-scale integration, to large-scale integration, to very large-scale integration. The first generation of computers were developed and implemented prior to 1959 and included the UNIVAC 1 and others based on vacuum tube technology.

Second generation computers were built between 1959 and 1965 and were constructed with transistor technology in which computers became smaller, less expensive, generated less heat and required less power. Following the use of transistors,

there was a trend toward miniaturization, or the use of microelectronics. Microelectronic techniques have resulted in even smaller, faster, and more reliable components.

Third-generation computers are characterized by the use of hybrid or integrated circuits, by the integration of hardware with software (programming and operating aids), and by an orientation to data communications and the handling of more than one operation simultaneously. The fourth generation of computers is now being introduced in which integrated circuits are being utilized much more extensively, continuing the trend toward reduced hardware size, reduced cost, increased speed, and an improved cost/performance ratio.

To clarify some terms, a "microprocessor" is the basic central processor semiconductor integrated circuit, without any of the supporting circuitry and devices required to make it fully operational. A "microcomputer" is the combination of microprocessor, support circuitry (clock and control circuits), memories, and circuits. It is a true computer that has been built around a microprocessor I/O. Computers are now categorized as mainframe computers, minicomputers, and microcomputers. In general, mainframe computers are the largest and most powerful machines with the most memory and a larger, sophisticated CPU. Minicomputers are the intermediate size and microcomputers are the smallest. In reality, there is a lot of overlap among products, with the most powerful

microcomputers offering a lot more capability than the least powerful minicomputers. Likewise, the most powerful minicomputers offer a great deal more capability than the least powerful mainframes.

In terms of price, a microcomputer or microcomputer system can range from $1,500-$50,000; a minicomputer or minicomputer system from $50,000-$750,000+; and a mainframe from $500,000-millions. It is sensible to give only the very roughest estimate of price since any final system can consist of many different variables: number and type of peripherals amount of memory, amount and type of disk and tape transport, and operating and applications software.

The most important thing to remember is that the exploding growth of computer sophistication is continuing unabated. A process which needed a mainframe yesterday might run today on a mini or even a micro.

Storage Technology

Before information can be manipulated, it must be in machine-readable form. The first storage system is the computer memory itself in which the computer's programs reside and where the computer holds small amounts of data for processing. The largest computer systems have no more than about 16,000,000 characters of this storage and the more

common computers now have approximately forty-eight million characters of actual computer memory.

Another type of memory found in computer systems is disk drives, electromechanical devices that store anywhere from five million characters up to about 600 million characters. It is likely that within the next few years, disk drives will be made that hold up to a billion characters per drive.

A third storage technology of interest is that of bubble memory which may fill the gap between the disk drives and the very high speed, expensive computer memory. Laboratory models have been developed which contain perhaps a quarter of a million characters and which are expensive to produce. While bubble memory theoretically could decrease the price of storage, present technological work in the United States is being discontinued by many of the major companies.

Another storage technology still in the experimental stages today that will have a drastic impact on the future of libraries and computing is the video disk. A video disk is an optical device currently used for storing optical images. One side of a video disk is capable of containing approximately 54,000 frames.

The devices are already available which are capable of recording and playing back digital information that can be stored on the video disk. In commercial quantities, a video

disk playback unit is available for home use. The recording process, however, is presently quite extensive since disks are made like records as they are pressed (produced) in one technology. As with phonorecords, a stamping out process is involved which can produce 1,000 disks or more. Consequently, no single custom-made disk is expensive.

The big problem to be solved in video disk technology is errors which result in the flicker on the screen. While television flicker can be accommodated for by the human eye, a computer cannot easily make such compensations. Computers also "see" errors on standard types of disk drives since, over the years, error recovery algorithms have been developed which can correct errors occuring in transmission or storage. The same algorithms do not work for video disks, however, and better error correcting schemes have to be developed before video disks can be commercially used for computers in anything other than experimental operations.

We are also faced with the problem today that recording or encoding onto disk equipment is prohibitively expensive except for mass production operations such as those found in for-profit situations. Work continues in this area, however, and costs should be coming down in the next five years.

Communications Systems

Communications systems deliver information to the user of the computer system. The traditional way of delivering information between a computer and a distant user is over the facilities provided by the telephone company. These facilities consist of circuits which carry the electrical signals, and devices called modems which convert computer data into these eletrical signals. Several types of communication services and networks are available, from those offering services to the user who needs one terminal to access a host for a few minutes per month, to those for a user who has twenty-five terminals online for twelve hours per day.

About 99 percent of today's communications to computer terminals is being done with phone lines using either copper cable or microwave transmission. Telephone companies are also beginning to utilize fiber optics in which cable is made of glass fibers so that data can be transmitted as light rather than as electricity. Fiber optics is now cheaper to lay than copper cable for major metropolitan areas though it is not yet feasible for cross-country transmission.

The other current communications technological development is occurring in the area of satellite transmission, though at the present time it is most cost effective for long distance transmission.

Dedicated line networks are those in which heavy users of terminal services may lease a permanent (twenty-four hours per day) dedicated line from their terminals directly to a host computer. The cost is dependent on line speed and distance of the line, and can become quite expensive if the line is long and can only be used by one terminal.

The other widely used communications networks are the commercial value added networks (VAN'S). The VAN'S lease a large number of inter-city telephone lines from the telephone companies, and place small message switching computers at various nodes. In each city served by a VAN there is communications equipment capable of receiving dozens to hundreds of simultaneous calls from terminals. There are also network hosts (computers offering various services), including the network vendors (providing search services and cataloging services), which pay the VAN to connect to the VAN network. Since a message transaction takes a small fraction of a second to transmit, many terminals can share the same line, in much the same way that many autos can share the same highway lane.

In this way the VAN makes heavier use of the line than a single user paying for a long distance call. The VAN'S charge the network host, which in turn bills the user, for the amount of time connected and the number of messages and characters transmitted. Since there is no charge component for

geographic distance, the user 3,000 miles from a service host and a user 150 miles from the same host pay the same cost for the same service. Thus, there is a great cost advantage to the distant user because the savings between a long distance call and the VAN charge is larger with distance.

Most service networks that are hosts on a VAN network also have a dial-up capability independent of the VAN which allows the user to dial the host computer directly. This is advantageous for users located nearby the host and users with special telephone service such as WATS. Terminals that have dial-up capability can be used either for direct dial or by accessing the VAN network.

APPENDIX XX

LIBRARY COMPUTERIZATION: ALTERNATIVE COURSES OF ACTION

There are major alternatives to consider when implementing a library system: purchasing a turnkey system, selecting a vendor to custom design a system, or developing the system in-house using staff librarians and programmers.

A turn-key system is one which is designed, marketed and maintained by a vendor, which supplies a complete system of software and hardware to perform a defined application. In addition, turn-key vendors may offer assistance in converting procedures to their system and in training users. Hardware maintenance may be performed by the turn-key firm. Software maintenance support varies among vendors.

The custom system approach includes two types of designers of custom systems. The first is oriented toward developing software for minicomputer configurations whose central processor and major subsystems are from a single manufacturer. In addition, some companies of this type offer their customers assistance in setting up systems involving the product line of the computers in which they specialize. Some of these vendors offer continuing software maintenance under contract, although many prefer that customers undertake their own software maintenance arrangements. This type

involves specialized hardware--regardless of manufacturer of each component--to support a specific application area. Software is provided on an "as-needed basis" to meet these applications.

The third alternative for creating computer-based library automation systems is to develop software within the library of the library's parent institution or within the computer center of the parent institution. With mini or microcomputer configurations dedicated to the library's applications, the typical centralized data processing department may not provide program development services unless other similar computers are being used elsewhere in the institution. To use the University computer, it would be necessary to include programming support. Unless the library is one that has previously been involved with in-house software development, it will need a development team. This means utilizing a staff of professionals in the computer field as well as one or more librarians who have had system development experience.

Each of these alternative approaches has advantage and disadvantages. A turnkey system, for example, can be purchased and implemented as a package. The system will have been tested and its reputation proven for providing a quality product and good service. Since a large number of users will use the same system, improvements in system features and

performance may be introduced frequently. Other advantages of turnkey systems include little, if any, development cost; reduced time in implementing the system; greater flexibility in tailoring the system to local needs; proven ability; good maintenance support of hardware and software; and the capability of linking the local system to other regional and national online databases.

Local development, on the other hand, may be more attractive because of specific library or university needs which require specialized programming and the existence of either hardware or programmers which do not have to be paid for separately.

In addition, the philosophy of system design and the concept of "total library systems" are prominent concerns. The philosophy behind this terminology varies with the system designer. In some cases, it implies that libraries should be automated completely or perhaps not at all. Proponents of this theory argue that to automate only one portion of a library's activities is to invite incompatability with systems that might later be developed for other activities. Others, less radical in approach, use such terms to apply only to design, not to implementation. They argue that the library should be studied as an integrated whole, its entire operations thoroughly understood and flow-charterd if possible, and a complete system designed to automate the whole. The

parts of the system could then be implemented one at a time, as funds permitted.

In later years, a variation of the philosophy has appeared in the idea of "integrated technical processing systems." Its proponents argue that good design demands the elimination of redundant keyboarding operations as much as possible, and that in library systems, therefore, bibliographic data entered into the system at the time an item is ordered should be reused if possible, or modified as necessary, to produce various products such as circulation records, microform catalogs, or online public catalogs.

This issue is not yet resolved, though large library systems continue to attempt to integrate functions and move away from redundant data storage and data entry. We are beginning to see today, however, through microprocessor communications switches, how minicomputers can use one set of data in several specialized applications.

Because each academic library must exist within an environment specific to its institution, it is unlikely that all libraries would be able to undertake one, united alternative. It does seem likely, however, that the larger institutions will consistently move in the direction of mini or mainframe computer integrated, online systems which include the capability of handling the online catalog, serials,

circulation, acquisitions, word processing, and local library information services. Each institution, though, may chose a different alternative for development and/or implementation depending upon its institutional environment.

Smaller academic libraries will probably be drawn toward the smaller minicomputers or one or more microcomputers, and may or may not implement integrated systems. It is certainly the case that software is already available for supporting library functions on microcomputers and small databases could be handled effectively.

It is also becoming rapidly technically possible to integrate databases from microcomputer applications with those from mini and mainframe applications, depending upon the size of the records. One example of this possibility can be found in the ability to transfer files among all sizes of computers. At the University of Alabama, work is currently being undertaken to transfer files between an Apple microcomputer and a Univac mainframe computer. With this capability in hand, it will be possible to merge microcomputer serial holdings records with OCLC series holdings records, to sort the records in the larger Univac computer, and to produce a union list on microcomputer floppy disks.

APPENDIX XXI

CHART OF INFORMATION SERVICES & INDEPENDENT DATA BANKS

ADP Network Services, Inc. P. O. Box 2190 175 Jackson Plaza Ann Arbor, MI 48106 (313) 769-6800	A large distributor offering computational databanks in Agriculture, Autos, Commodoties, Demographics, Economics, Finance, Insurance, and International Business. Its main suppliers are Chase Econometric Associates and Standard & Poor's.
Bibliographic Retrieval Services, Inc. Corporation Park Building 702 Scotia, NY 12303 (518) 374-5011	A large distributor offering bibliographic databanks in Agriculture, Business, Education, Environment, General News Publications, Science, and Social Science. Its suppliers are various trade associations and governmental groups.
Compus Serve Network 5000 Arlington Centre Blvd. Columbus, OH 43220 (614) 457-8600	A distributor offering statistical databanks in Demographics, Economics, and Finance. Its suppliers include Citibank, Value Line (Arnold Bernhard and Co.), and Standard & Poor's.
The Computer Co. 1905 Westmoreland SDt. Richmond, VA 23230 (804) 861-0165	A statistical databank vendor specializing in the Airline Industry. Its main supplier is the Civil Aeronautics Board.
Data Resources Inc. 29 Hartwell Ave. Lexington, MA 02173 (617) 861-0165	A large vendor offering databanks in Agriculture, Banking, Commodities, Construction, Economics, Energy, Finance, Insurance, International Business Securities, and the Steel and Transportation Industries. In addition, detailed U.S. regional, national, and international economic, demographic, and financial indicators are tracked. Compustat, Value Line, and Standard & Poor's are sources.
Dow Jones News/Retrieval Service 22 Cortland St. New York, NY 10007 (212) 285-5000	A bibliographic databank compiling The Wall Street Journal, Barron's, and the Dow Jones News Service. Dow Jones compiles its own databank, which is updated immediately after appearing on the ticker and then maintained for ninety days.

Appendix XXI
Chart of Information Services & Independent Data Banks (cont.)

General Electric Information Services Co. 401 N. Washington St. Rockville, MD 20850 (301) 340-4000	A computational databank vendor covering Economics, Energy, Finance and International Business. Its suppliers include the University of California and Value Line.
Infomart One Yonge St. Toronot, ON Canada, M5E1E5 (416) 366-3904	A large Canadian vendor with databanks covering Agriculture, Business, Education, Energy, Engineering, Environment, Fondations, General News, Publications, Government, Patents, Pharmaceuticals and Science.
Informatics, Inc. 6 Kingsbridge Rd. Fairfield, NJ 07006 (201) 575-2800	A statistical databank vendor covering Demographics, Energy, Environment, and Transportation. Suppliers include governmental groups and the John Hopkins University Medical Center.
Ineractive Data Corp. 486 Totten Pond Rd. Waltham, MA 02154 (617) 890-1234	A large computational databank distributor covering Agriculture, Autos, Banking, Commodities, Demographics, Economics, Energy, Finance, International Business, and Insurance. Its main suppliers are Chase Econometric Associate, Standard & Poor's, and Value Line.
Lockheed Information Systems 3251 Hanover St. Palo Alto, CA 94304 (415) 493-4411	The largest bibliographic distributor offering over seventy-five different data banks in Agriculture, Business, Economics, Education, Energy, Engineering, Environment, Foundations, General News Publications, Government, International Business, Patents, Pharmaceuticals, Science, and Social Sciences. It ecomomic source is Predicasts Terminal Systems, Inc.; it relies on many trade associations and governmental groups for other data bases.
Mead Data Central, Inc. Courthouse Place, N.E. Dayton, OH 45463 (513) 222-6323	A bibliographic databank vendor specializing in General News Publications and Legal Literature. Mead compiles its own data banks.

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Appendix XXI
Chart of Information Services & Independent Data Banks (cont.)

National CSS, Inc. 542 Westport Ave. Norwalk, CT 06851 (203) 853-7200	A financial vendor of computational databanks covering Autos, Commodities, Economics, and Finance. Its main suppliers are Merrill Lynch Economics, and Value Line.
The New York Times Information Services, Inc. 1719A Rte. 10 Parsippany, NJ 07054 (201) 539-5850	A bibliographic databank vendor covering Advertising, General News Publications, and Public Opinion Indexes. The New York Times Information Service maintains its own databanks.
Rapidata, Inc. 20 New Dutch Lane P. O. Box 1049 Fairfield, NJ 07006 (201) 227-0035	A statistical databank vendor covering Economics and Finance. Rapidata compiles some of its own data banks and uses Citibank, Telrate and the Federal Reserve Board as additional suppliers.
SDC Search Service 2500 Colorado Ave. Santa Monica, CA 90406 (213) 820-4111	One of the largest bibliographic distributors offering over fifty different databanks in Agriculture, Business, Education, Energy Engineering, Environment, Foundation, General News Publications, Government, Industry, Science, and Social Science. Its suppliers are various trade associations and government groups.
Service Bureau Co. 500 W. Putnam Ave. Greenwich, CT 06830 (203) 622-2000	A statistical databank distributor covering Agriculture, Banking, Demographic Economics, Engineering, Finance and Insurance. Its suppliers include Standard & Poor's, Data Resources, Inc., and Telstat.
I.P. Sharp Associates, Ltd. 145 King St. W. Toronto, ON Canada M5H1J8 (416) 364-5361	A Canadian distributor with Canadian and American statistical databanks covering Airlines, Banking, Commodoties, Demographics, Economics, Environment, Finance, and International Business. Its suppliers include the Bank of Canada, Citibank, and the International Monetary Fund.

Appendix XXI
Chart of Information Services & Independent Data Banks (cont.)

Time Sharing Resources, Inc. 777 Northern Blvd. Great Neck, NY 11022 (516) 487-0101	A statistical databank covering Commodities, Economics, and Finance. Its suppliers include the U.S. Department of Labor, Citibank, and the Federal Reserve Board.
Uni-Coll Corp. 3401 Science Center Philadelphia, PA 19104 (215) 387-3890	A computational databank vendor covering Agriculture, Commodities, Economics, and Finance. The Wharton Economic Forecast supplies most of its databanks.
United Computing Systems, Inc. 2525 Washington Ave Kansas City, Mo 64108 (816) 221-9700	A statistical databank vendor covering Demographics and Finance. Its supplies include CACI and Standard & Poor's.

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